Back

FURUNO

OPERATOR'S MANUAL

VIDEO PLOTTER

MODEL RP-250

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⚠ SAFETY INSTRUCTIONS

⚠ WARNING

Be sure to insert the memory card battery correctly.

Explosion may result if it is installed with polarity reversed.

⚠ NOTICE

No one navigational aid should be relied upon exclusively for the safety of vessel and crew. The navigator has the responsibility to check all aids available to confirm his position. Electronic aids are not a substitute for basic navigational principles and common sense.

Digital charts cannot replace official nautical charts

Digital charts are intended as an navigational aid. Therefore, position should always be checked against nautical charts, as well as other aids to navigation.

Handle chart/memory cards carefully

The chart and memory cards are weak against electrostatic discharge. Handle them with care, observing the following guidelines.

- Keep cards away from heat sources.
- Replace cards in their protective cases after use.

Replace memory card battery within 10 minutes of removal.

Replace the memory card battery within 10 minutes of removal to prevent loss of data.

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FOREWORD

A Word to the Owner of the RP-250

FURUNO Electric Company thanks you for purchasing the RP-250 Video Plotter. We are confident you will discover why the FURUNO name has become synonymous with quality and reliability.

For over 50 years FURUNO Electric Company has enjoyed an enviable reputation for quality and reliability throughout the world. This dedication to excellence is furthered by our extensive global network of agents and dealers.

Your equipment is designed and constructed to meet the rigorous demands of the marine environment. However, no machine can perform its intended function unless properly installed and maintained. Please carefully read and follow the operation, installation and maintenance procedures set forth in this manual.

We would appreciate feedback from you, the end-user, about whether we are achieving our purposes.

Thank you for considering and purchasing FURUNO.

Features

The main features are

- Storage for 100 waypoints (two are automatically assigned), 20,000 marks, 20,000 own ship track points, 20,000 target track points, 30 nav lines.
- AIS feature (requires AIS transponder) provides navigation data about AIS-equipped targets.
- Memory cards for recording, replaying data.

1 OPERATIONAL OVERVIEW

1.1 General

The Video Plotter RP-250 is an optional circuit board (RP board) which is accommodated in the display unit of the FR-2105 series radar. It permits use of two memory cards, a memory card (RAM card) for storing own ship and other ship tracks and marks, and the other is a chart card (ROM card) for digital charts.

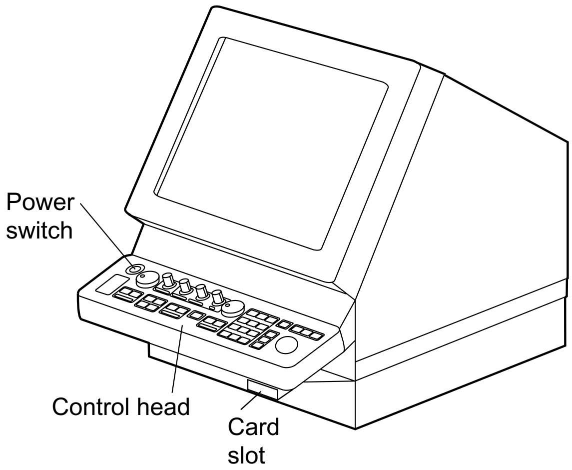
With connection of an AIS (Universal Automatic Identification System) transponder to the RP board, the RP-250 provides navigation data about targets which carry an AIS transponder.

30 navigation lines may be stored and each line may contain up to 30 waypoints. Five nav lines may be simultaneously shown on the display. 100 waypoints are available. The user may enter position data in waypoints 01-98. (Waypoint 00 is for own ship position when destination is set; waypoint 99 is for waypoint from external equipment.) Own ship and other ship tracks may be stored at a selected interval.

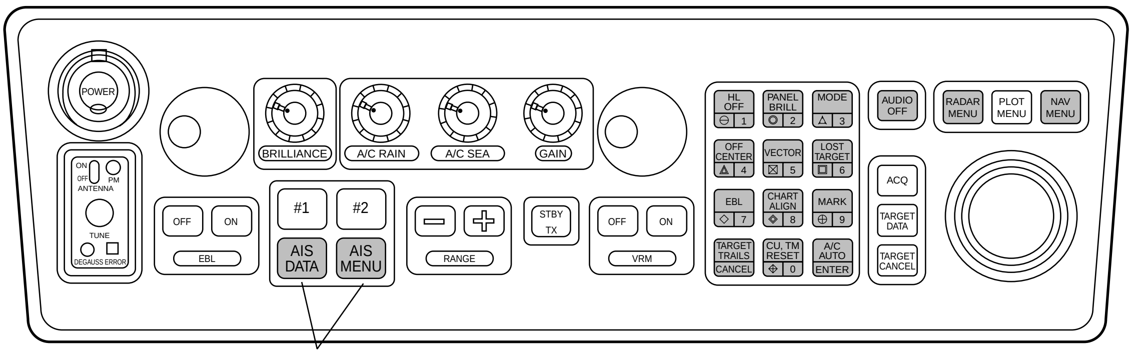
Charts are superimposed on the radar picture without disturbing the radar observation. The chart area is dependent on the radar range in use. The RP-250 comes in two versions: FURUNO/NAVIONICS and FURUNO/C-MAP.

Note: The example screens shown in this manual may not match the screens you see on your display. The screen you see depends on your system configuration and equipment settings.

1.2 Controls



FR-2105 series radar display unit



FR-2105 series control head (RP-250-related controls shaded in gray)

<u>Video plotter controls</u>

RADAR MENU:	Open and close the radar menu.
NAV MENU:	Open and close the video plotter menu.
CHART ALIGN:	Align video plotter display with radar display.
MARK:	Enter various marks.
Numeric keys:	Enter data.
ENTER:	Terminate keyboard input.

<u>AIS controls</u>

AIS MENU:	Open AIS menu.
AIS DATA:	Display basic data for selected target.
AUDIO OFF:	Silence AIS-related alarms.
VECTOR:	Alternately display true and relative speed and course vector.
LOST TARGET:	Erase AIS lost target marks. (ARPA lost target mark is also erased.)

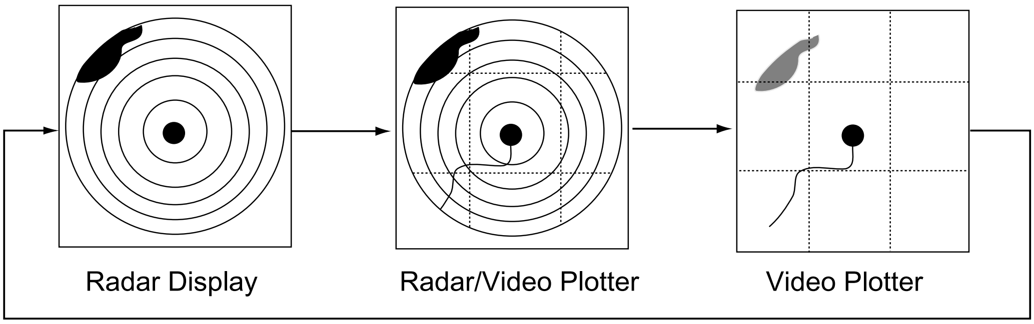
Note 1: A single beep is produced to signify that the radar has accepted your command. Two beeps sound in case of incorrect key operation.

Note 2: When the NAV MENU key is pressed in the plotter/radar or plotter mode, the message “Chart displayed is for reference only. Position should be confirmed against nautical charts.” appears. Use the electronic chart as an aid to navigation.

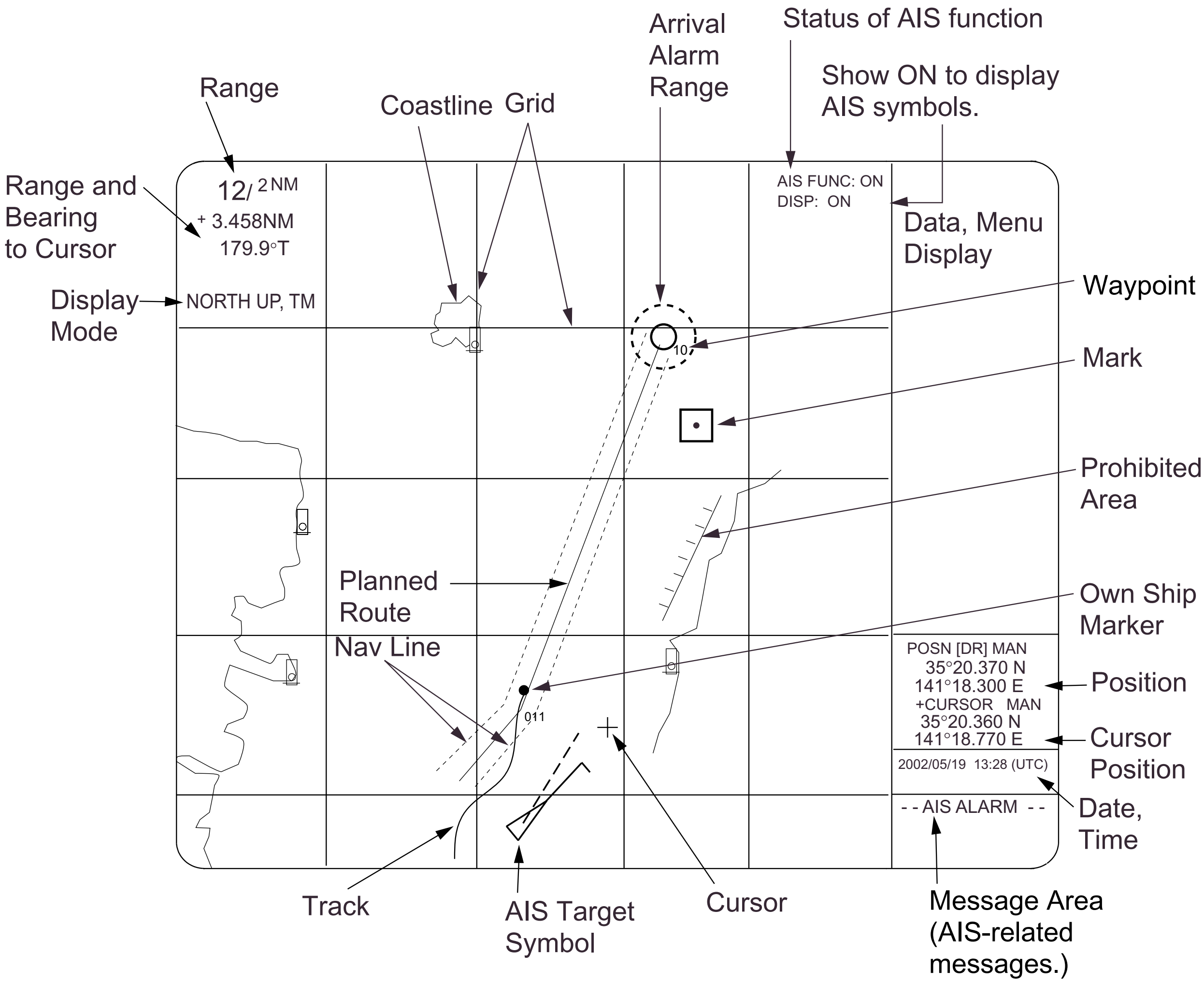
1.3 Choosing Display Mode

1. Press the [RADAR MENU] key.
2. Press the [9] key to choose display mode desired. The illustration at the bottom of the page shows a sample video plotter display. Note that the video plotter is not available when SHIP TYPE is set for DEEP SEA.

Note: When the radar display is selected, the display shows the indication AIS: OFF and when the radar/video plotter display is in use the indication AIS: ON appears. AIS-related alarms will be released even if the display shows AIS: OFF, provided the AIS feature is active.



Display modes



Video plotter display

About the radar/video plotter display

When using the radar/video plotter display, you may erase marks, lines, grid, etc. from the display to give priority to the radar display. This is also useful for brightening charts.

1. Press the [NAV MENU] key to show the VIDEO PLOTTER 1 menu.
2. Press the [7] key to choose PLOTTER PRESENTATION.
3. Press the [7] key again to choose DEFAULT.
4. Press the [ENTER] key.
5. Press the [NAV MENU] key to close the menu.

Note: To restore the normal display, choose USER SET at step 3.

Item and default setting (DEFAULT selected at step 3 above)

Item	Setting	Item	Setting
Lighthouse, wreck	ON	Background	Black (green characters)
Coastline	ON	Echo color	Yellow
Land density	ON	Heading line brilliance	Bright
Place name	OFF	Plotter brilliance	MED 2
Mark	OFF	Range rings brilliance	OFF
Own track	OFF	Chart brilliance	MED 1
Other track	OFF	Symbol brilliance	MED 1
Depth contour	OFF	Grid brilliance	OFF

1.4 Choosing Presentation Mode

The RP-250 has five presentation modes: True Motion, North-up, Course-up, Head-up and Cursor Gyro. You may choose a mode with the [MODE] key.

Note 1: Charts are not available for use in the Head-up and Cursor Gyro modes.

Note 2: In the true motion mode, the own ship mark is automatically reset to a point of 75% radius when it is at a distance from the screen center 3/4 the range.

1.5 Charts

This section shows you how to display charts and correct their position.

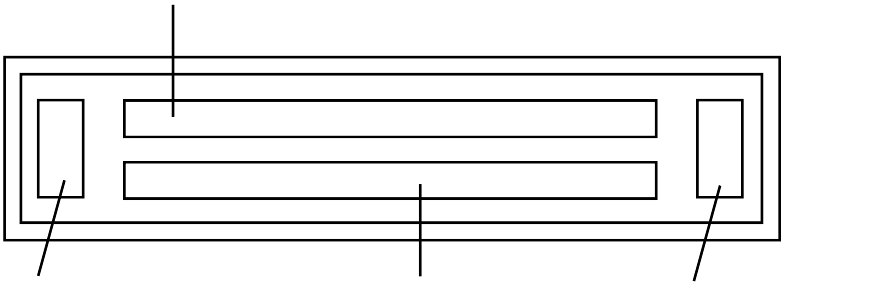
Both the chart card and memory card are susceptible to sunlight. Handle them carefully, following the guidelines below.

- Keep them away from direct sunlight and heat sources.
- Keep cards away from water and chemicals.
- Keep the connector free of foreign material.
- Do not drop the cards.

1.5.1 Displaying a chart

To display a chart, do the following:

1. Insert the chart card in the upper slot.



Card slots

2. Turn on the power switch.
3. After the radar is set in transmit status, choose the video plotter display or the radar/video plotter display.

To eject a card, press the Eject button and pull out the card.

Note: If a card inserted after the power is turned on, change the range with the [RANGE] key to display the chart.

1.5.2 Chart, cursor position correction

Chart position correction

There may be a case where the radar picture does not match the chart overlay. This is due to an error in the position fixing system (GPS, Loran, etc.) or the different coordinates between the position fixing system and the radar. In this case, align the chart with the radar image as below. Note that track is neither recorded nor plotted while chart position is being corrected.

1. Press the [CHART ALIGN] key. M. ALIGNING appears at the top of the screen.
2. Rotate the trackball to shift the chart (or own ship) to the correct position.
3. Press the [CHART ALIGN] key again. MAN ALIGNED appears.

Canceling chart position correction

1. Press the [NAV MENU] and [0] keys to show the VIDEO PLOTTER 2 menu.
2. Press the [2] key to choose NAV DATA POSN.
3. Press the [ENTER] key to cancel correction.
4. Press the [NAV MENU] key to close the menu.

Cursor position correction

The cursor position can be corrected as follows:

1. Press the [NAV MENU] and [0] keys to show the VIDEO PLOTTER 2 menu.
2. Press the [3] key to choose ALIGN +CURSOR DATA.
3. Press the [3] key again to choose OFF or ON as appropriate and then press the [ENTER] key. ON corrects cursor position and “COR: ON” appears at the cursor data location (bottom right hand side of the screen).

   Note: To use AIS choose ON.
4. Press the [NAV MENU] key to close the menu.

1.6 Setting up the Video Plotter Display

1.6.1 Hiding/Showing graphics

1. Press the [NAV MENU] and [8] keys to display the PLOT DISPLAY SELECT menu. Current selections appear in reverse video.

   Blank items have been turned off on the VIDEO PLOTTER INITIAL SETTINGS menu. For further details, see paragraph 6.1.

```
        [PLOTTER DISP SELECT]
1 [VIDEO PLOTTER(1)]
2 DANGER HIGHLIGHT
  OFF/ON
3 COAST LINE
  OFF/ON
4 LAND DENSITY
  OFF/ON
5 PLACE NAME
  OFF/ON
6 MARK
  OFF/ON
7 OWN SHIP PLOT
  OFF/SEPARATE/CONTINUE
8 TARGET PLOT
  OFF/ON
9 CONTOUR LINE
  OFF/ON
0 GRID
  OFF/ L/L
```

Note 1: For C-MAP chart the following points differ:
COAST LINE, LAND DENSITY:
Always ON
PLACE NAME:
ON: Displays place name and chart border line.
CONTOUR LINE:
ON: Displays contour line and spot soundings.

Note 2: For C-MAP, unit for spot soundings is fixed for meters and neither port nor tide info is available.

PLOTTER DISP SELECT menu

2. Press appropriate numeric key twice to hide or show graphic as appropriate.
3. Press the [ENTER] key.
4. Repeat steps 2 and 3 to hide or show other graphics.

5. Press any menu key to close the menu.

Note 1: LAND DENSITY fills (ON) or hollows (OFF) land on an electronic chart. Land will be hollow when wrong card or wrong scale is used, regardless of LAND DENSITY setting.

Note 2: OWN SHIP PLOT functions as follows:

OFF: Own track is neither plotted nor recorded.

SEPARATE: Own track is neither plotted nor recorded when RECORD OWN SHIP PLOT of OWN SHIP, TARGET PLOT menu is OFF own ship plotting.

CONTINUE: Own track is plotted but not recorded when RECORD OWN SHIP PLOT of OWN SHIP, TARGET PLOT menu is OFF own ship plotting.

1.6.2 Hiding/Showing nav data

You may choose what navigation data to display on the video plotter display as follows:

1. Press the [NAV MENU] and [1] keys to display the NAV INFORMATION 1 menu.

```
[NAV INFORMATION(1)]
1 [VIDEO PLOTTER(1)]
2 SELECT NAVAID
  GPS+LC/DEAD RECKONING
  /AIS
3 OWN SHIP POSN
  OFF/ L/L
4 POSN
   00°00.000 N/S
  000°00.000 E/W
5 +CURSOR DATA
  OFF/L/L
6 WPT DATA
  OFF/REL/TRUE
7 [NAV LINE]
8 [WAY POINT]
9 WIND DATA
  ON/OFF
0 [NAV INFORMATION(2)]
```

NAV INFORMATION 1 menu

2. Press appropriate numeric key to choose both item and option. Press the [ENTER] key to register selection.

Note 1: Item 2 chooses source of position data as below.

GPS+LC: Own ship position data fed from GPS or Loran C navigator.

DEAD RECKONING: Position data entered at item 4 (POSN) is used as starting point for dead reckoning.

AIS: Own ship position data fed from AIS transponder.

Note 2: When dead reckoning navigation is used on the IMO type radar (G mode), the AIS feature is automatically turned off, no AIS symbols are displayed, and the menu item "AIS OFF/ON" is not shown on the AIS1 menu.

For manual input of position (item 4), do the following:

a) Press the [4] key.
b) Enter latitude in six digits with the numeric keys.
c) Press the [ENTER] key. (To change coordinate, press the [4] key and then press the [ENTER] key).
d) Enter longitude in eight digits.
e) Press the [ENTER] key. (To change coordinate, press the [4] key and then press the [ENTER] key).

3. Press the [0] key to go to next page, the NAV INFORMATION 2 menu. Choose options as you did on the NAV INFORMATION 1 menu.

```
          [NAV INFORMATION(2)]
1 [NAV INFORMATION(1)]
2 WIND GRAPH
  OFF/ON
3 WIND UNIT
  m/s/KT
4 CURRENT DATA
  OFF/ON
5 CURRENT GRAPH
  OFF/ON
6 DEPTH DATA
  OFF/ON
7 DEPTH GRAPH
  OFF/ON
8 DEPTH SCALE
  10/20/50/100/200/500
9 DEPTH UNIT*
  m/ft
0 [NAV INFORMATION(3)]
```

*= R, G type fishing mode

NAV INFORMATION 2 menu

4. Press the [0] key to display the NAV INFORMATION 3 menu.

```
          [NAV INFORMATION(3)]
1 [NAV INFORMATION(2)]
2 WATER TEMPERATURE*
  OFF/ON
3 DATE
  OFF/UTC/LOCAL   ±00.00H
4 USED WPL#
  NAV LINE/WP
5
6
7
8
9
0 [AIS(1)]
```

*= R, G type fishing mode

= USED WPL not shown on G-type radar.

NAV INFORMATION 3 menu

5. To choose time system, press the [3] key several times to choose OFF, UTC or LOCAL. To use local time, select LOCAL, press [ENTER] twice, and enter time difference between it and UTC time.
6. Press the [ENTER] key.
7. Press the [NAV MENU] key to close the menu.

2 TRACK

This section provides the information necessary for setting the track display conditions for own ship and other vessels.

2.1 Stopping Plotting of Own Ship's Track

1. Press the [NAV MENU] and [5] keys.

```
               [OWN SHIP, TARGET PLOT]
1 [VIDEO PLOTTER(1)]
2 RECORD OWN SHIP PLOT
      OFF/ON
3 OWN SHIP PLOT INTVL
      10/30SEC/1/2/3/6MIN
4 OWN SHIP PLOT COLOR
      RED/MAGENTA/YEL*/
      GRN*/CYAN/BLU/WHITE*
5 RECORD TARGET PLOT
      OFF/ON
6 TARGET PLOT INTVL
      10/30SEC/1/2/3/6MIN
7 [TARGET PLOT COLOR]
8 SMOOTHING
      OFF/1/2/3/4/5/6/7/8/9
```

* = Not available on IMO type.

OWN SHIP, TARGET PLOT menu

2. Press the [2] key twice to choose OFF.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

Own ship's track is not plotted. To resume plotting, choose ON at step 2 and press the [ENTER] key.

2.2 Stopping Plotting of Other Ship’s Track

1. Press the [NAV MENU] and [5] keys.
2. Press the [5] key twice to choose OFF.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu. Then, other ship's tracks are not plotted.

To resume plotting of other ship’s tracks, choose ON at step 2 and press the [ENTER] key.

2.3 Track Plotting Interval

The memory stores ship's position in latitude and longitude at a sampling rate set on the OWN SHIP, TARGET PLOT menu. The position data so stored is used to display past own ship's track on the screen. The memory for own ship track and other ship track is 20,000 points each. The plotting interval affects track reconstruction. A shorter interval provides more accurate reconstruction of track, however storage time of the track is reduced. A longer interval stores more track, however the track is less accurate.

The memory for own ship track is 20,000 points. The table below shows the relation between plotting interval and maximum recording time. When the storage capacity is exceeded oldest data is erased to make room of the latest.

Interval	Max. Recording Time	Interval	Max. Recording Time
10 s	55 hrs 30 min	2 min	27 days 18 hr 40 min
30 s	166 hrs 40 min	3 min	41 days 16 hr
1 min	13 days 21 hrs 20 min	6 min	83 days 8 hr

The memory for other ship's track is 20,000 points for 10 ships. The table below shows the relation between plotting interval and maximum recording time for each ship. Note that the track of ARPA targets 1 thru 10 may be displayed. The track of ARPA targets 11 thru 30 cannot be displayed.

Interval	Max. Recording Time	Interval	Max. Recording Time
10 s	5 hrs 30 min	2 min	66 hrs 40 min
30 s	16 hrs 40 min	3 min	100 hrs
1 min	33 hrs 21 min	6 min	200 hrs

2.3.1 Choosing track plotting interval

1. Press the [NAV MENU] and [5] keys.
2. To change own ship's track plotting interval, press the [3] key several times to display desired plotting interval in reverse video. The choices are 10, 30 s; 1, 2, 3, 6 min.
3. Press the [ENTER] key.
4. To change other ship's track plotting interval, press the [6] key several times to choose plotting interval.
5. Press the [ENTER] key.
6. Press the [NAV MENU] key to close the menu.

2.3.2 Finding track memory used

1. Press the [NAV MENU] and [0] keys. Memory used appears as below.

MEMORY IN USE	
OWN SHIP	= 03456
TARGET	= 01124
MARK	= 00021

MEMORY IN USE display

2. Press the [NAV MENU] key to close the menu.

2.4 Smoothing

Even when the vessel is sailing in a straight line the track shown on the display looks irregular. This is due to signal variation of the external navaid. You can compensate for this irregularity with smoothing.

A smoothing factor between 1 and 9 is available. OFF provides no smoothing. In most cases a smoothing setting between 1 and 5 is satisfactory.

1. Press the [NAV MENU] and [5] keys.
2. Press the [8] key to choose smoothing factor.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

2.5 Erasing Track

In busy traffic, the screen may become cluttered. You can remove all or a percentage of own ship's track from the memory to clear the display. Tracks of other ships can also be cleared.

1. Press the [NAV MENU] key and the [9] key to display the PLOTTER ERASE menu.

```
              [PLOTTER ERASE]
1 [VIDEO PLOTTER(1)]
2 OWN SHIP PLOT
  30%/50%/80%/ALL
3 TARGET PLOT
  30%/50%/80%/ALL
4 MARK
  OFF/ALL
5 WPT
  OFF/ALL
6 NAV LINE
  OFF/ALL
```

PLOTTER ERASE menu

2. Press the [2] key several times to choose OWN SHIP PLOT and the amount of track you wish to erase.
3. Press the [ENTER] key.
4. To erase other ship's track, press the [3] key several times to choose TARGET PLOT and the amount of track to erase.
5. Press the [ENTER] key.
6. Press the [NAV MENU] key to close the menu.

2.6 Own Ship Track Color

You may display own ship's track in red, magenta, yellow*, green*, cyan, blue or white* as below. (* = Not available on IMO type.)

1. Press the [NAV MENU] key and the [5] key to choose OWN SHIP, TARGET PLOT.
2. Press the [4] key to choose color desired.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

2.7 Other Ship Track Color

You may display other ship's track in red, magenta, yellow*, green*, cyan, blue or white* as below. (* = Not available on IMO type.)

1. Press the [NAV MENU] key and the [5] key to choose OWN SHIP, TARGET PLOT.
2. Press the [7] key to choose TARGET PLOT COLOR.

```
= [TARGET PLOT COLOR] =
1 [OWN SHIP, TARGET PLOT]
2 TARGET NUMBER
    01
3 TARGET PLOT COLOR
   RED/MAGENTA/YEL/
   GRN/CYAN/BLU/WHITE
 TARGET PLOT COLOR LIST
 TARGET NO.      COLOR
    01             RED
    02             RED
    03             RED
    04             RED
    05             RED
    06             RED
    07             RED
    08             RED
    09             RED
    10             RED
```

TARGET PLOT COLOR menu

3. Press the [2] key to choose the target number you want to change the track color.
4. Key in target number (two digits).
5. Press the [ENTER] key.
6. Press the [3] key to choose color desired.
7. Press the [ENTER] key.
8. Press the [NAV MENU] key to close the menu.

3 MARKS, LINES

You can inscribe marks on the display to note important points, for example, a buoy or a wreck. The mark memory capacity is 20,000 points.

3.1 Choosing Method of Entry

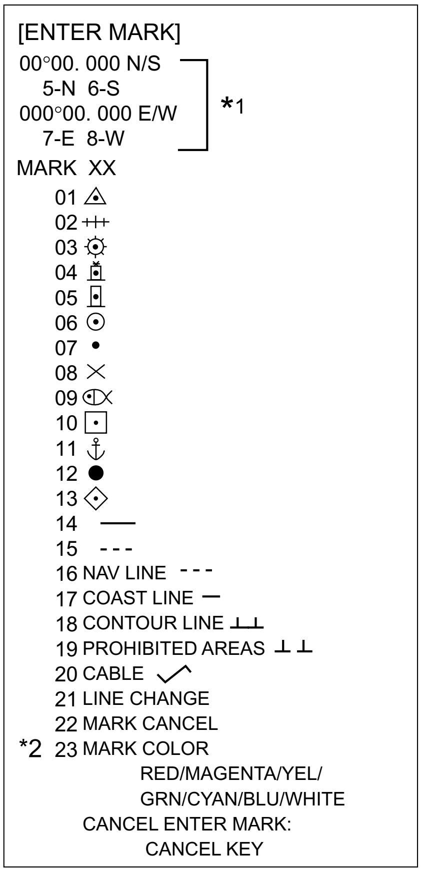
Marks can be entered by cursor position, specific latitude and longitude or own ship position.

1. Press the [NAV MENU], [0] and [6] keys.
2. Press the [6] key to choose method of mark entry; CURSOR, L/L or OWN SHIP POSN.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

3.2 Entering Marks/Lines

3.2.1 Entering marks/lines at cursor or own ship position

1. Press the [MARK] key to display the ENTER MARK menu.



*1 = Shown when mark entry method is "latitude and longitude."

*2 = Not shown on IMO type.

ENTER MARK menu

2. **For entry at own ship's position,** enter mark number to choose desired mark, followed by the [ENTER] key. The chosen mark appears at own ship position.
3. **For entry by cursor,** operate the trackball to place the cursor on the position desired for the mark. Enter mark number to choose desired mark and then press the [ENTER] key. The chosen mark appears at the cursor position.
4. **To inscribe a line,** first select the mark entry method (see paragraph 3.1) for "cursor." Then, do the following:
    a) Use the trackball to place the cursor on the starting point of the line.
    b) Enter desired line number with the numeric keys and press the [ENTER] key.
    c) Use the trackball to place the cursor on the ending point of the line and then press the [ENTER] key.
    d) Repeat c) to continue drawing the line.
5. To escape the mark entry mode, press the [CANCEL] key.

3.2.2 Entering marks at desired position

1. Press the [MARK] key to open the MARK menu.
2. Enter latitude by the numeric keys and then press the [ENTER] key. To change polarity, press [5] for North; [6] for South.
3. Enter longitude and then press the [ENTER] key. To change polarity, press [7] for East; [8] for West.
4. Enter mark number to choose desired mark.
5. Press the [ENTER] key.
6. To escape the mark entry mode, press the [CANCEL] key.

3.2.3 Line change feature

The line change feature allows you to change line type, or to inscribe a separate line. For example, you may want to quit making nav lines and start making a coastline.

1. Press the [MARK] key to open the ENTER MARK menu.
2. Inscribe a line as mentioned in paragraph 3.2.1.
3. Press the [2] and [1] keys to choose LINE CHANGE.
4. Enter line no. to be changed.
5. Use the trackball to place the cursor at the beginning of the line and then press the [ENTER] key.
6. Use the trackball to place the cursor at the end of the line and then press the [ENTER] key.
7. Repeat step 6 to continue drawing the line.
8. Press the [MARK] key to close the menu.

3.3 Mark/Line Color

Not available on IMO type.

1. Press the [MARK] key.
2. Press [2], [3] and [ENTER] key.
3. Continue pressing the [ENTER] to choose desired mark color.
4. Press the [CANCEL] key to close the menu.

Then, marks/lines will be inscribed in the color selected.

3.4 Erasing Marks/Lines

When the mark memory becomes full no marks can entered unless you erase unnecessary marks.

3.4.1 Erasing individual marks

1. Set mark entry method to CURSOR, referring to paragraph 3.1.
2. Press the [MARK] key to open the ENTER MARK menu.
3. Press the [2] key twice to choose MARK CANCEL.
4. Operate the trackball to place the cursor on the mark you want to erase.
5. Press the [ENTER] key.
6. Press the [CANCEL] key to escape.

3.4.2 Erasing all marks and all lines

1. Press the [NAV MENU] and [9] keys.
2. Press the [4] key twice to choose MARK ALL followed by the [ENTER] key.
3. Press the [NAV MENU] key to close the menu.

3.4.3 Erasing line segments

1. Set mark entry method to CURSOR, referring to paragraph 3.1.
2. Press the [MARK] key to open the mark menu.
3. Press the [2] key twice for MARK CANCEL.
4. Operate the trackball to place the cursor on the starting point, end point or intersection of the line you want to erase. Choosing the intersection of two lines erases both line segments.
5. Press the [ENTER] key.
6. Press the [CANCEL] key to escape.

3.5 Finding Mark/Line Memory Used

1. Press the [NAV MENU] and [0] keys. Mark memory used appears as below.

MEMORY IN USE	
OWN SHIP	= 03456
TARGET	= 01124
MARK	= 00021

MEMORY IN USE display

2. Press the [NAV MENU] key to close the menu.

4 WAYPOINTS, NAVIGATION LINES

4.1 Entering Waypoints

100 waypoints are available. The user may enter position data in waypoints 01-98, by the trackball, by latitude and longitude position, and at own ship position. Waypoint 00 is reserved for own ship position and waypoint 99 is for a waypoint from external equipment.

4.1.1 Entering waypoints at cursor position

1. Press the [NAV MENU], [4] and [2] keys. The following display appears.

```
            [ENTER WPT]
1 [ENTER WPT, NAV LINE]
2 ENTER WPT
      CURSOR/ L/L/
      OWN SHIP POSN
3 WPT NO. 01
      00°00.000N/S
      000°00.000E/W
```

ENTER WPT menu

2. Press the [2] key several times to choose CURSOR and then press the [ENTER] key.
3. Press the [3] key to choose WPT NO.
4. Use the trackball to place the cursor on position desired.
5. Enter waypoint number in two digits with the numeric keys and then press the [ENTER] key.
6. To continue entering waypoints by this method, repeat steps 4 and 5.
7. Press the [NAV MENU] key to close the menu.

4.1.2 Entering waypoints at specific position

1. Press the [NAV MENU], [4] and [2] keys.
2. Press the [2] key to choose L/L and then press the [ENTER] key.
3. Press the [3] key to choose WPT NO.
4. Enter waypoint number in two digits with the numeric keys and then press the [ENTER] key.
5. Key in latitude and then press the [ENTER] key. To change polarity, press the [3] key.
6. Key in longitude and then press the [ENTER] key. To change polarity, press the [3] key.
7. To continue entering waypoints by this method, repeat step 4-6.
8. Press the [NAV MENU] key to close the menu.

4.1.3 Entering waypoints at own ship position

1. Press the [NAV MENU], [4] and [2] keys.
2. Press the [2] key to choose OWN SHIP POSN.
3. Press the [3] key to choose WPT NO.
4. Enter waypoint number in two digits with the numeric keys and then press the [ENTER] key.
5. Press the [NAV MENU] key to close the menu.

4.2 The Waypoint List

To display the waypoint list, which shows all registered waypoints, do the following:

1. Press the [NAV MENU], [4] and [3] keys. Waypoint 00 (for own ship position) through 09 are shown. Empty waypoints are denoted with asterisks and 00 normally shows all asterisks.
2. To go to a next page, press the [0] key. Pressing the [1] key returns to previous page.

```
[WPT LIST(1)]
1 [ENTER WPT, NAVLINE]
     WPT
00       **° **.***   *
        ***° **.***   *
01       **° **.***   *
        ***° **.***   *
02       **° **.***   *
        ***° **.***   *
03       **° **.***   *
        ***° **.***   *
04       **° **.***   *
        ***° **.***   *
05       **° **.***   *
        ***° **.***   *
06       **° **.***   *
        ***° **.***   *
07       **° **.***   *
        ***° **.***   *
08       **° **.***   *
        ***° **.***   *
09       **° **.***   *
        ***° **.***   *
9 ERASE          WPT00
0 [WPT LIST (2)]
```

WPT List

3. Press the [NAV MENU] key to close the menu.

4.3 Displaying Waypoints

A waypoint may be shown on the display as below.

4.3.1 Displaying waypoints

1. Press the [NAV MENU] and [2] keys to choose the WAYPOINT menu.

```
              [WAY POINT]
1 [NAV INFORMATION(1)]
2 WPT MARK
  OFF/ON
3 WPT
     WPT 00
     WPT 00
     WPT 00
     WPT 00
     WPT 00
4
5
6
7 WPT DATA
   VIDEO PLOTTER/NAVAID
8 ARRIVAL ALARM
  OFF/ON
  x.xxNM
```

WAYPOINT menu

2. Press the [2] key twice to choose WPT MARK ON and then press the [ENTER] key.
3. Press the [3] key.
4. Enter waypoint number (01 to 98) in two digits and then press the [ENTER] key. The latitude and longitude position of the waypoint appears on the menu and the waypoint is displayed on the screen. Five waypoints may be displayed.
5. Press the [NAV MENU] key to close the menu.

Note 1: To display no waypoints, choose OFF at step 2 in above procedure.
Note 2: To clear all waypoints currently shown, enter 00 at step 4.

4.3.2 Displaying waypoints from a navigator

1. Press the [NAV MENU], [1], [0] and [0] keys to show the NAV INFORMATION 3 menu.
2. For other than G-type radar, press the [4] key several times to choose USED WPL WP and then press the [ENTER] key.
3. Press [1], [1], [1] and [2] keys to show the WAYPOINT menu.
4. Press the [7] key to choose NAVAID.
5. Press the [ENTER] key.
6. Press the [NAV MENU] key to close the menu.

Note: Route data fed from a navigator is displayed waypoint by waypoint.

4.4 Deleting Waypoints

Waypoints can be deleted individually or collectively.

4.4.1 Deleting individual waypoints

1. Press the [NAV MENU], [4] and [3] keys to display the waypoint list.
2. Press the [0] key to display the page which contains the waypoint you want to delete.
3. Press the [9] key and enter waypoint number in two digits.
4. Press the [ENTER] key.
5. Press any menu key to close the menu.

4.4.2 Deleting all waypoints

1. Press the [NAV MENU] and [9] keys to display the PLOTTER ERASE menu.
2. Press the [5] key to shown WPT ALL and then press the [ENTER] key.
3. Press the [NAV MENU] key to close the menu.

Note: Waypoints currently displayed can be deleted collectively but not individually. Waypoints used in a navigation line cannot be deleted collectively or individually unless the navigation line is deleted.

4.5 Navigation Lines

30 navigation lines may be entered, and each line may have up to 30 waypoints.

4.5.1 Entering new navigation line

1. Press the [NAV MENU], [4] and [5] keys.

```
          [ENTER NAV LINE]
1 [ENTER WPT, NAV LINE]
2 NAV LINE 01
   WPT   →  → →
         →  → →
         →  → →
         →  → →
         →  → →
         →  → →
         →  → →
         →  → →
         →  → →
         →  → →

8 ADDING    WPT00→00
9 DELETEING    WPT00
```

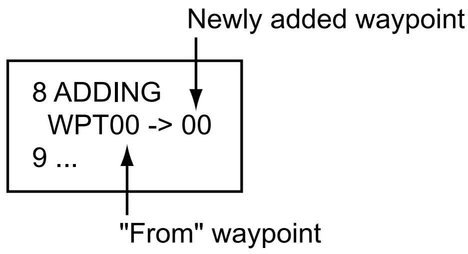
ENTER NAV LINE menu

2. Press the [2] key.
3. Enter navigation line number in two digits and then press the [ENTER] key.
4. Enter waypoint number in two digits and then press the [ENTER] key.
5. Repeat step 4 to continue entering waypoint numbers.
6. Press the [ENTER] key followed by the [NAV MENU] key to register navigation line.

4.5.2 Adding waypoints to navigation lines

To add waypoints to a navigation line, do the following:

1. Press the [NAV MENU], [4] and [5] keys.
2. Press the [2] key. Enter navigation line number and then press the [ENTER] key twice.
3. Press the [8] key.
4. Enter “FROM” waypoint number and then press the [ENTER] key.
5. Enter waypoint number to add and press the [ENTER] key.



Add waypoint screen

6. Press the [NAV MENU] key to close the menu.

4.5.3 Removing waypoints from navigation lines

1. Press the [NAV MENU], [4] and [5] keys.
2. Press the [2] key, enter navigation line number and then press the [ENTER] key twice.
3. Press the [9] key, enter waypoint number and then press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

4.5.4 Nav line list

1. Press the [NAV MENU], [4] and [6] keys to display the list.
2. Press the [NAV MENU] key to close the menu.

4.5.5 Deleting individual navigation lines

1. Press the [NAV MENU], [4], [6] and [9] keys.
2. Enter navigation line number you want to delete. (The line in use is not deleted.)
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

4.5.6 Deleting all navigation lines

1. Press the [NAV MENU] and [9] keys.
2. Press the [6] key twice to choose ALL.
3. Press the [ENTER] key.
4. Press the [NAV MENU] key to close the menu.

4.5.7 Setting up navigation lines

Navigation lines may be set up as follows:

1. Press the [NAV MENU] and [3] keys.

```
[NAV LINE]
1 [NAV INFORMATION(1)]
2 NAV LINE
  OFF/ON
3 NAV LINE NO.
   →  →  →
   →
4 NAV WIDTH
  OFF/ON 0.00NM
5
6 WPT NO.
  **→●→**→
  (**) → (**)
7 NAV LINE DATA
  VIDEO PLOTTER/NAVAID
8 ARRIVAL ALARM
  OFF/ON
  *.**NM
9
```

NAV LINE menu

2. Press the [2] key to choose NAV LINE ON.
3. Press the [7] key.
4. Press the [7] key to choose NAV LINE DATA. Choose VIDEO PLOTTER for internally generated navigation width data or NAVAID for external navaid generated data. Press the [ENTER] key.

   Note: For NAVAID, set USED WPL on the NAV INFORMATION 3 menu to NAV LINE. (Not available on G-type radar.). RTE and WPL sentence required to display navigation line. Only Numeric ID data in the WPL sentence is read.

5. Press the [4] key to set NAV WIDTH to ON and press the [ENTER] key.
6. Enter lane width (in nautical miles) and then press the [ENTER] key.
7. To enter waypoint where to head or skip current waypoint and head to next waypoint, press the [6] key and enter waypoint number.
8. Press the [ENTER] key. For example, you are following waypoints 11, 12, 13 and 14 on a nav line. Then, to head to waypoint 12, display (11)→●12→(13) →(14).
9. To get the audio alarm when you near a waypoint, press the [8] key to choose ARRIVAL ALARM.
10. Press the [8] key to choose ON and press the [ENTER] key.
11. Key in the alarm range and then press the [ENTER] key. For alarm range less than 0.5 nm, waypoints are automatically switched when your ship is 0.5 nm from a waypoint, therefore the audio alarm does not sound.

Note: Waypoints are automatically switched when own ship is either 1/2 of the arrival alarm range or 0.5 nm from next waypoint, whichever figure is larger. For example, the arrival alarm range is 2 miles. Since 1/2 of the arrival alarm range is 1 mile and it is larger than 0.5 miles, the waypoint will be switched when your ship is 1 mile from a next waypoint.

12. Press the [NAV MENU] key to close the menu.

Note: To display the nav line by using the external data, IEC 61162-1 data sentence BWR, BWC, RMB, or WPL is required. The order of priority is BWR>BWC>RMB>WPL. In case of simultaneous input BWR has priority. To use BWR, BWC, RMB for waypoint sentences, set USED WPL# to NAV LINE in the NAV INFORMATION 3 menu. That is the normal usage. To use the WPL for destination waypoint, set USED WPL# to WPT in the NAV INFORMATION 3 menu. This should only be used when connected to a navigator which outputs only the WPL data sentence. The data sentence and displayed data are as follows:

BWR: Range and bearing to waypoint (great circle)
BWC: range and bearing to waypoint
RMB: Generic navigation data (range and bearing to waypoint, latitude and longitude position of waypoint, course, etc.
WPL: Latitude and longitude of waypoint

Input waypoint sentence	Display Contents			
	Display		Data Display	
	Radar Display	Radar/Video Plotter Display	Radar Display	Radar/Video Plotter Display
BWR, BWC, RMB, or WPL	• WPT No. • Nav line	• WPT • Nav line • Nav line width • Arrival alarm range	• Rng to WPT • Bearing to WPT (Data not displayed in case of sentence WPL)	• WPT • Rng to WPT • Bearing to WPT
When data of above sentences changes (destination waypoint changed)	Above data is erased and replaced with latest data.	Above data is erased and replaced with latest data.	The above data is updated and displayed. (Data not displayed in case of sentence WPL)	The above data is updated and displayed.
No input of above sentences (waypoint cancelled)	30 seconds later the above data is erased.	30 seconds later the above data is erased.	30 seconds later asterisks (*) shown for above data. (Data not displayed in case of sentence WPL)	30 seconds later asterisks (*) shown for above data.

4.5.8 Displaying navigation lines

Set nav line as show in previous paragraph and then follow the procedure below to display nav line.

1. Press the [NAV MENU] and [3] keys.
2. Press the [3] key to choose NAV LINE NO.
3. Key in nav line no. with the numeric keys and then press the [ENTER] key. You may enter five nav line numbers. Note that the same nav line no. cannot be entered more than once.
4. Press the [NAV MENU] key to close the menu.

Note: To remove a nav line from the display, set NAV LINE to OFF.

5 RECORDING, REPLAYING DATA

5.1 Formatting Memory Cards

Before you can use a memory card (RAM card) with the RP-250, the card must be formatted. Formatting prepares the recording surface of the card for use with the system. The RAM card comes in three types shown below.

Note: You may format previously used memory cards; however, all data stored on the card will be erased.

Type	Code No.
00RAM01MC-003	00432818000
00RAM256C-001	00432107000
00RAM512C-002	00432223000

1. Insert a new memory card in the lower slot and press the [NAV MENU] and [6] keys to choose CARD.
2. If RECORD is not in reverse video, press the [6] key again.
3. Press the [ENTER] key.

```
            [RECORD]
1 [VIDEO PLOTTER(1)]
2 OWN SHIP PLOT
     T
3 TARGET PLOT
     A
4 MARK
     M
5
6
7
8
9
0 FORMAT
     NO/YES
```

RECORD menu

4. Press the [0] key twice to choose YES.
5. Press the [ENTER] key.
6. Press the [NAV MENU] key to close the menu.

5.2 Recording Data

When the track memory becomes full, the oldest track is erased to make room for the latest. Further, when the mark memory becomes full you cannot enter another mark unless you erase a mark. If you need to keep track and marks, save them to a memory card as below.

1. Insert a formatted RAM card into the lower slot.
2. Press the [NAV MENU] and [6] keys to choose CARD.
3. If RECORD is not in reverse video, press the [6] key again.
4. Press the [ENTER] key.
5. Do one of the following depending on what you want to record:
   - Own ship's track: Press the [2] key.
   - Target track: Press the [3] key.
   - Marks: Press the [4] key.
6. Enter file name. You may use seven figures.
7. Press the [ENTER] key to begin recording. “COMPLETED” appears when the recording has been completed.
8. Press the [NAV MENU] key to close the menu.

5.3 Replaying Data

You may wish to replay data on the screen for analysis purposes.

1. Place appropriate memory card in the lower slot.
2. Press the [NAV MENU] and [6] keys.
3. If REPLAY is not in reverse video, press the [6] key again.
4. Press the [ENTER] key.

[REPLAY CARD(1)]
1 [VIDEO PLOTTER(1)] 2 *** 3 *** 4 *** 5 *** 6 *** 7 *** 8 *** 9 *** 0 [REPLAY CARD(2)]

REPLAY CARD 1 menu

5. Press appropriate numeric key to choose the file to replay. You can go to the next page by pressing the [0] key.
6. Press the [NAV MENU] key to close the menu.

6 OTHER PLOTTER FUNCTIONS

6.1 Initial Settings

An item on the PLOTTER DISP SELECT menu can be deleted through the VIDEO PLOTTER INITIAL SETTING menu. To restore the item reselect it on the [PLOTTER DISP SELECT] menu, following paragraph 1.6.1.

Note: Normally, the VIDEO PLOTTER INITIAL SETTING menu is not displayed. To display it, press the [RADAR MENU] key five times while pressing and holding down the [1] key.

1. Press the [NAV MENU] key.
2. Press the [0] key twice to display the VIDEO PLOTTER INITIAL SETTING menu.

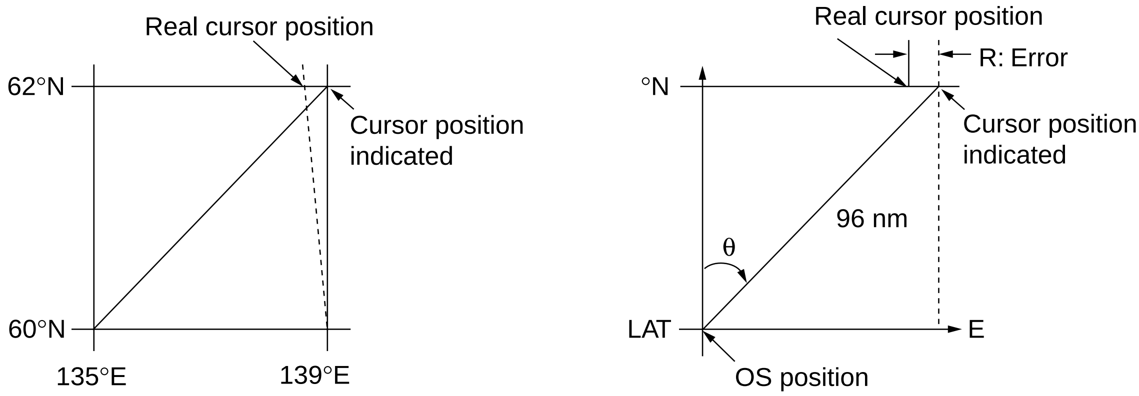
```
 [VIDEO PLOTTER INITIAL SETTING]
1 [VIDEO PLOTTER(2)]
2 DANGER HIGHLIGHT
      OFF/ON
3 COAST LINE
      OFF/ON
4 LAND DENSITY
      OFF/ON
5 PLACE NAME
      OFF/ON
6 MARK
      OFF/ON
7 OWN SHIP PLOT
      OFF/ON
8 TARGET PLOT
      OFF/ON
9 CONTOUR LINE
      OFF/ON
0 GRID
      OFF/ON
```

VIDEO PLOTTER, INITIAL SETTING menu

3. Press appropriate numeric key to turn item on or off as appropriate.
4. Press the [ENTER] key.
5. Repeat steps 3 and 4 to set other items.
6. Press the [NAV MENU] key to close the menu.

6.2 Longitude Error Table (on 96 nm range scale)

The longitude lines concentrate on the north pole and south pole, namely, 1 nm is equivalent to 1 minute at 0 degree latitude, 2 minutes at 60 degrees latitude, 3 minutes at 70 degrees latitude and so on. For this reason, a longitude error occurs on the radar display. For example, when own ship is at 60°N and 135°E, even if the cursor indication is 62°N and 139°E, the real cursor position is deviated to the left (west) side. The table below shows the longitude error, represented from 0° to 90° at 96 nm from the radar center (own ship).



Distance error in direction of longitude due to latitude

(nm)

LAT \ θ	5°	10°	15°	20°	25°	30°	35°	40°	45°
75°	0.2256	0.4444	0.6496	0.8350	0.9950	1.1248	1.2202	1.2786	1.2980
70°	0.21980213	0.43290201	0.632803	0.8134132	0.96923215	1.09551918	1.1884382	1.24517456	1.26402037
65°	0.21229339	0.41810678	0.61115946	0.78556318	0.93600295	1.05790007	1.14755221	1.20224625	1.22034042
60°	0.20316898	0.40012949	0.58486463	0.75173456	0.89565021	1.0122297	1.09793265	1.15016811	1.16737294
55°	0.19249832	0.37910698	0.55411863	0.71218478	0.84848102	0.95885565	1.03998717	1.08933651	1.10552105
50°	0.18036264	0.35519924	0.51915545	0.66721485	0.79485438	0.89818413	0.97406698	1.02021439	1.03525547
45°	0.16685429	0.32858822	0.48024119	0.61716701	0.73517843	0.83067689	0.90076355	0.94332783	0.95711098
40°	0.15207608	0.29947644	0.437672	0.56242216	0.66990732	0.7568477	0.82060477	0.85926197	0.87168229
35°	0.13614047	0.26808546	0.39177186	0.53339693	0.59953781	0.67725844	0.73420069	0.76865661	0.77961957
30°	0.11916876	0.2346542	0.3428901	0.44054055	0.52460545	0.59251483	0.6422089	0.67220131	0.68162348
25°	0.10129001	0.19943707	0.29139874	0.37433139	0.44568053	0.50326182	0.54532952	0.57063015	0.57843983
20°	0.08264056	0.16270211	0.23768966	0.30527334	0.36336372	0.41017869	0.44429984	0.46471615	0.47085389
15°	0.06336208	0.12472888	0.18217162	0.23389198	0.27828148	0.31397386	0.33988878	0.35526538	0.35968447
10°	0.04360137	0.0858064	0.12526714	0.16073056	0.19108136	0.21537949	0.23289096	0.24311083	0.24577764
5°	0.02350833	0.04623087	0.0674093	0.08634588	0.10242699	0.11514595	0.1241207	0.12910605	0.13000029
0°	0.00323737	0.0063035	0.00903844	0.01130406	0.01299309	0.01403609	0.0144058	0.0141187	0.01323356

(nm)

LAT \ θ	50°	55°	60°	65°	70°	75°	80°	85°	90°
75°	1.2780	1.2192	1.1233	0.9933	0.8332	0.6479	0.4431	0.2249	0
70°	1.24442563	1.18701379	1.09356117	0.96694117	0.81103484	0.3061092	0.43117887	0.21881975	0
65°	1.20131324	1.14577786	1.05546143	0.93315023	0.78260251	0.60843159	0.41596331	0.21107193	0
60°	1.14905813	1.09582188	1.00932899	0.89225746	0.74821409	0.58162173	0.397582	0.20171772	0
55°	1.08805799	1.03752602	0.95551494	0.84457408	0.70813132	0.55038538	0.37617487	0.19082831	0
50°	1.0187708	0.97133397	0.89442885	0.79046297	0.66265924	0.51496026	0.35190481	0.17848659	0
45°	0.94174265	0.89774948	0.82653562	0.73033596	0.61214392	0.47561599	0.32495654	0.16478648	0
40°	0.85754099	0.81733258	0.75235195	0.66465066	0.55696981	0.43265198	0.29553516	0.14983224	0
35°	0.76681293	0.73069528	0.63744242	0.59390696	0.49755683	0.38639524	0.26386458	0.13373769	0
30°	0.67024897	0.63849695	0.58741521	0.51864327	0.43435714	0.33719779	0.23018583	0.11662531	0
25°	0.568584	0.54143927	0.49791741	0.43943239	0.36785173	0.28543407	0.19475522	0.09862535	0
20°	0.46259176	0.44026091	0.40463016	0.35687717	0.29854675	0.23149802	0.15784242	0.07987479	0
15°	0.35307892	0.3357319	0.30826343	0.2716059	0.22696965	0.17580013	0.11972833	0.06051633	0
10°	0.2487894	0.22864776	0.20955062	0.18426754	0.15366517	0.1187643	0.08070304	0.0406973	0
5°	0.12684572	0.11982348	0.10624302	0.09552679	0.0791912	0.04106355	0.04106355	0.02056855	0
0°	0.01184713	0.01008727	0.008104	0.00605903	0.00411455	0.00111154	0.00111154	0.00028325	0

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7 AIS OPERATION

The AIS (Automatic Identification System) feature automatically provides navigation data on AIS-equipped ships. AIS symbol and AIS menus 1-3 are available in the Radar/Video Plotter and Video Plotter displays. It is not available in the Radar mode.

> ⚠ **WARNING**
>
> **Confirm compass reading on radar and gyrocompass readout when the bearing of AIS targets do not match that of radar targets.**

7.1 Turning AIS Feature On/Off

1. Press the [AIS MENU] key to open the AIS menu.

```
  [AIS(1)]
1 ACTIVATE TARGET
2 SLEEP TARGET
3 BASIC DATA
4 [EXTENDED DATA]
5 LOST TARGET
6 [MESSAGE]
7 ACTIVATE ALL TARGETS
8 SLEEP ALL TARGETS
9 AIS
  OFF/ON
0 [AIS(2)]
```

(9 AIS) Not displayed on IMO type when using dead reckoning navigation. The AIS feature is disabled in the above condition.

AIS1 menu

2. Press the [9] key once or twice to choose OFF or ON as appropriate.
   ON: When DISP: ON is shown, all targets received from the AIS transponder are displayed with symbols.
   OFF: All AIS symbols disappear.
3. Press the [ENTER] key. “AIS FUNC: ON” or “AIS FUNC: OFF” appears at the top right hand corner on the display.
4. Press any menu key to close the AIS menu.

Then, AIS targets are marked with appropriate AIS symbol as below.



AIS symbols

Note 1: The RP-250 continues to process AIS targets when the AIS feature is switched off. When the AIS is again turned on, symbols are immediately displayed.

Note 2: AIS symbols are momentarily erased after the screen is redrawn when bow direction is changed in the Head-up mode.

Note 3: The AIS menu can also be opened without using the function key as below.

1) Press the [RADAR MENU] key to open the FUNCTIONS 1 menu.
2) Press the [9] key once or twice to choose radar/plotter mode.
3) Press the [NAV MENU] key twice to open the VIDEO PLOTTER 1 menu.
4) Press the [1] key.
5) Press the [0] key three times to open the AIS 1 menu.

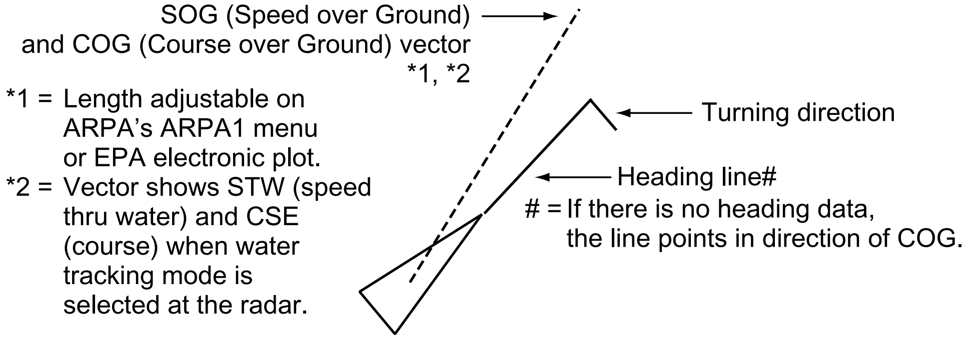
7.2 Turning AIS Display On/Off

1. Press the [RADAR MENU] key.
2. Press the [9] key once or twice to choose OFF or ON as appropriate. AIS DISP: OFF or AIS DISP: ON appears at the top right-hand corner depending on your selection. Note that the CPA/TCPA alarm for AIS is always active regardless of whether the AIS display is on or off.

Note: You may also turn the AIS display on or off by pressing the function key with the video plot function active.

7.3 Activating Targets

1. Use the trackball to place the cursor on the sleeping AIS target (indicates only the presence of a vessel equipped with AIS in a certain location) you wish to activate; that is, know more about a vessel's motion.
2. Press the [AIS MENU] key to open the AIS menu.
3. Press the [1] key (ACTIVATE TARGET) to activate the target. The activated AIS target symbol is superimposed on the radar echo as below.

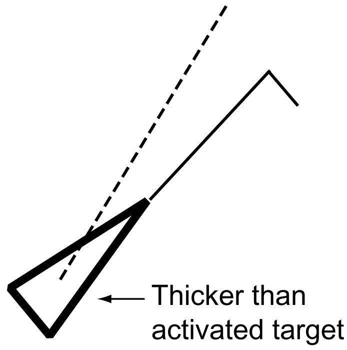


Activated target

4. Press any menu key to close the menu.

Dangerous target

When an AIS target violates the CPA/TCPA alarm setting (set on the ARPA 1 menu in case of ARPA or EPA menu in case of EPA) its symbol changes to the dangerous target symbol (red and flashing) and the indication “COLLISION” appears. Press the [AUDIO OFF] key to acknowledge the CPA/TCPA alarm. The audio alarm is silenced and the symbol stops flashing. Take appropriate action to avoid collision.



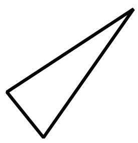
Dangerous target

7.4 Sleeping Targets

7.4.1 Sleeping an AIS target

You may “sleep” an AIS target as below when the screen becomes filled with targets. Note that targets that have been activated automatically cannot be “slept.”

1. Use the trackball to place the cursor on an activated AIS target symbol.
2. Press the [AIS MENU] key to open the AIS menu.
3. Press the [2] key (SLEEP TARGET) to sleep the target.
4. Press any menu key to close the menu. The target is marked with the sleeping target symbol, whose triangle is smaller than that of the activated AIS target symbol.



Sleeping target

7.4.2 Sleeping all AIS targets

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [8] key (SLEEP ALL TARGETS) to sleep all targets.
3. Press any menu key to close the menu.

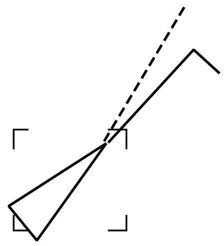
7.4.3 Activating all sleeping AIS targets

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [7] key (ACTIVATE ALL TARGETS).
3. Press any menu key to close the menu.

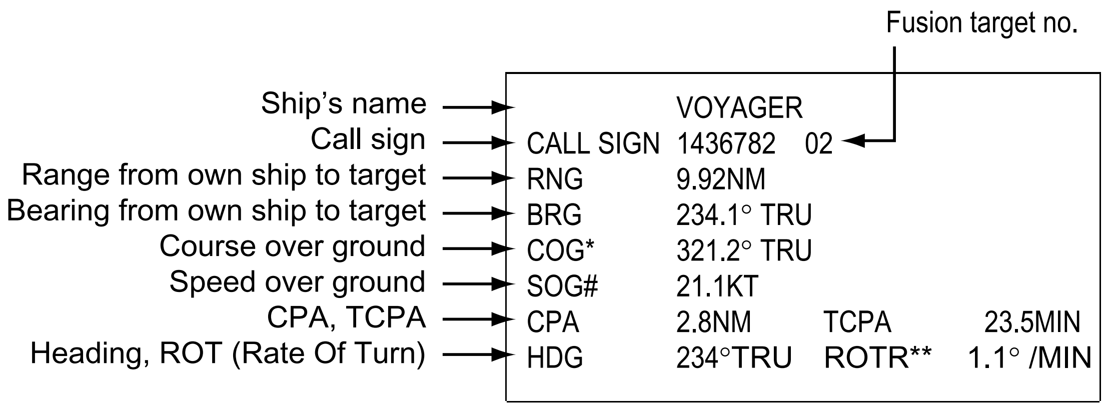
7.5 Displaying Target Data

7.5.1 Basic target data

1. Place the cursor on an AIS target symbol.
2. Press the [AIS DATA] key to show the target's basic data. The target is marked as below.



Activated target selected for data display



* = CSE (course) when water tracking mode is selected at radar.
= STW (speed thru water) when water tracking mode is selected at radar.
** = ROTR: right turn, ROTL: Left turn

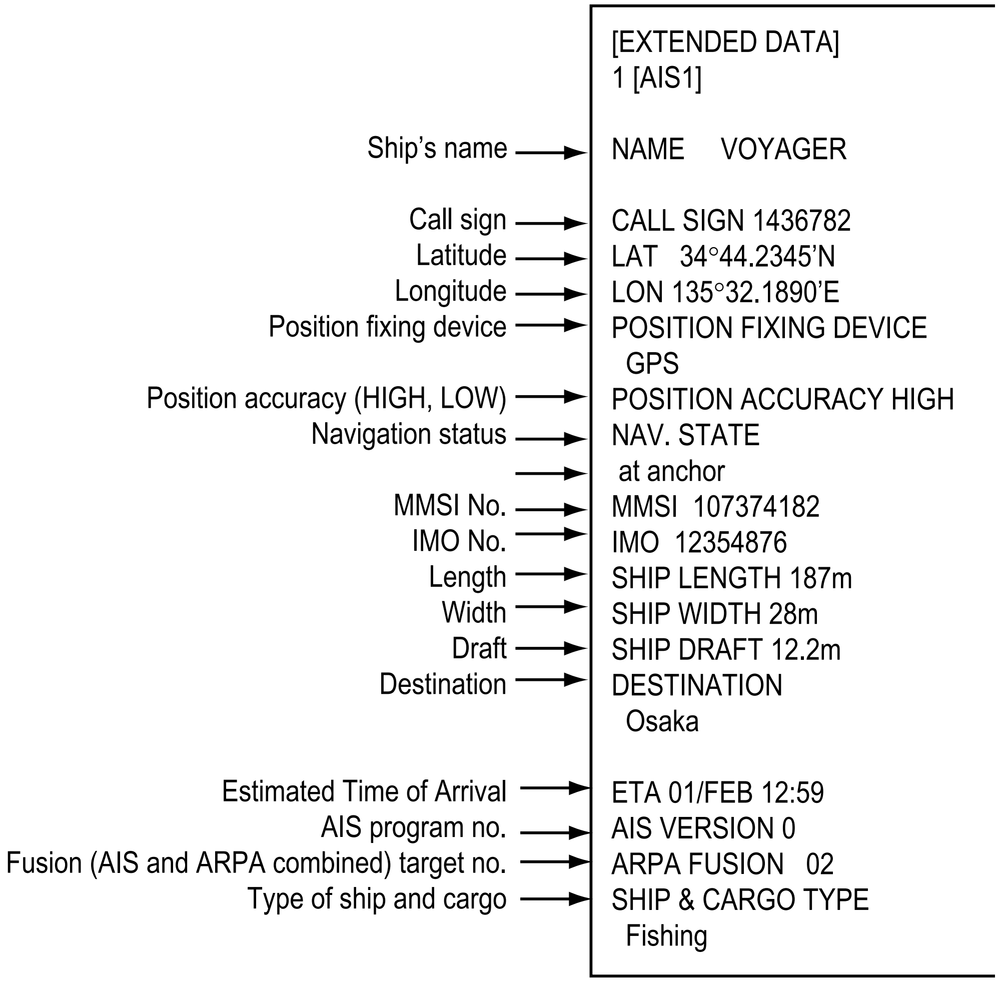
Basic data display

3. Press any menu key to close the data display.

Note: You may also show basic data by pressing the [AIS MENU] key followed by the [3] key (BASIC DATA). Basic data is hidden by the AIS1 menu; close the AIS1 menu to show basic data.

7.5.2 Extended target data

1. With basic data displayed as in paragraph 7.4.1, press the [AIS MENU] key to open the AIS menu.
2. Press the [4] key (EXTENDED DATA) to display the selected target's extended data.

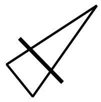


Extended data display

3. Press any menu key to close the data display.

7.6 Lost Target

A target is declared a lost target when no data is received for six minutes or five reporting intervals, whichever is the shorter. When this occurs, the target is marked with the (flashing) lost target symbol and the indication “LOST” appears. Press the [LOST TARGET] key to acknowledge the lost target, and the lost target disappears. However, the target which becomes a lost target is a activated target or a sleeping target within the lost target range (see paragraph 7.11).



Lost target

Note: If an ARPA lost target mark is displayed when the [LOST TARGET] key is pressed to acknowledge a lost target, the ARPA lost target will also be erased. To erase only the AIS lost target, do the following:

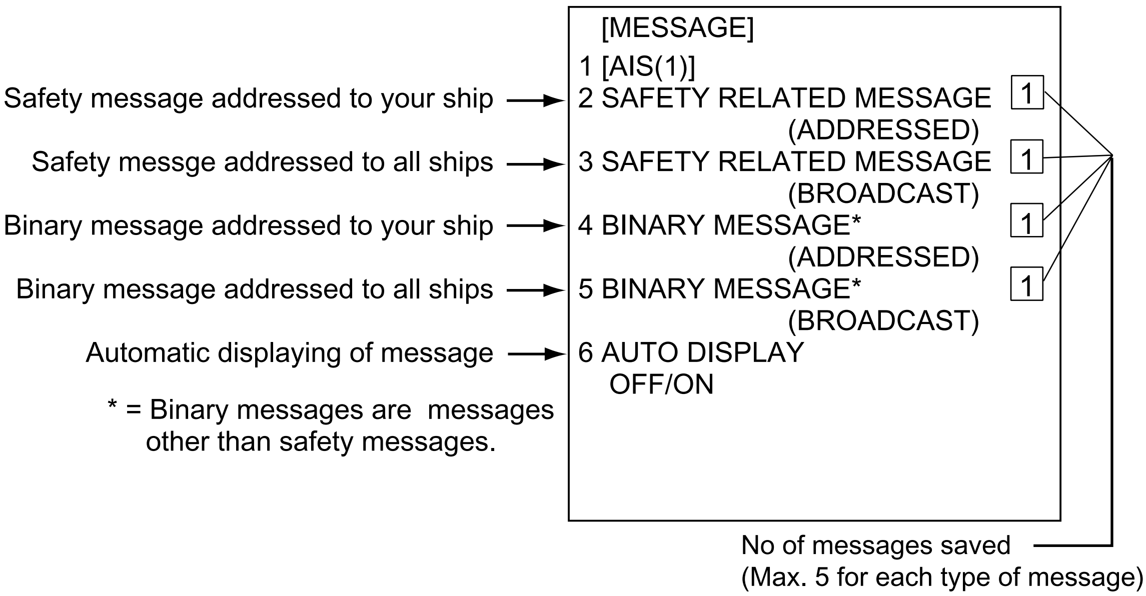
1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [5] key (LOST TARGET) to erase the lost target symbol and then press any key to close the menu.

7.7 Messages

You may display messages received by the AIS transponder as below.

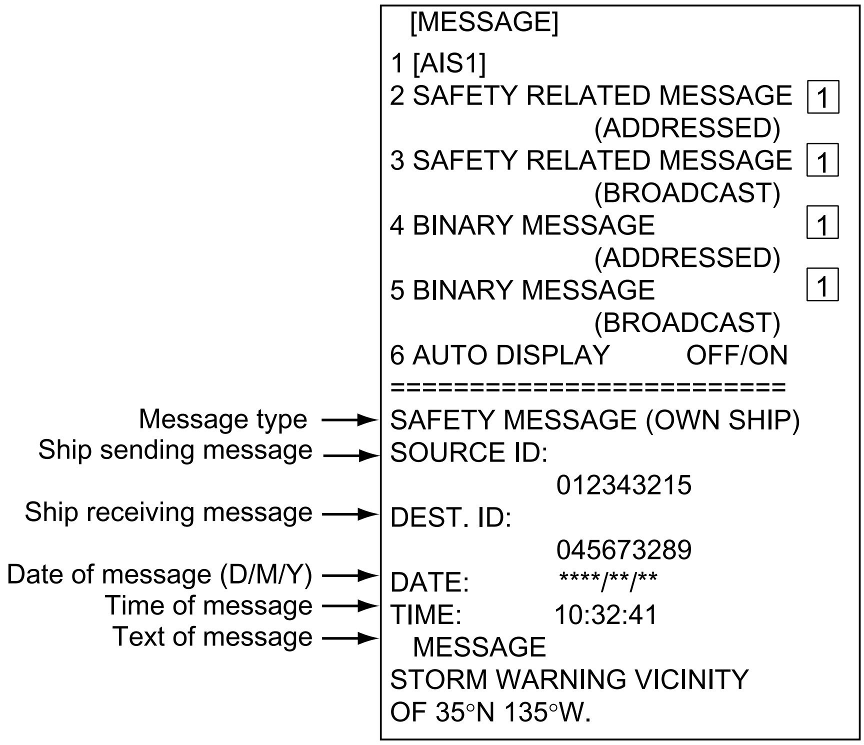
7.7.1 Displaying messages manually

1. Press the [AIS MENU] key to display the AIS menu.
2. Press the [6] key ([MESSAGE]) to display the MESSAGE menu.



Message menu

3. Press appropriate numeric key among 2-5 to choose the type of message you want to see. The example below shows a safety related message (addressed).



Safety related message

4. Key is same number entered at step 3.
5. Press any menu key to close the message display.

7.7.2 Automatically displaying messages

You can automatically display a message when it is received.

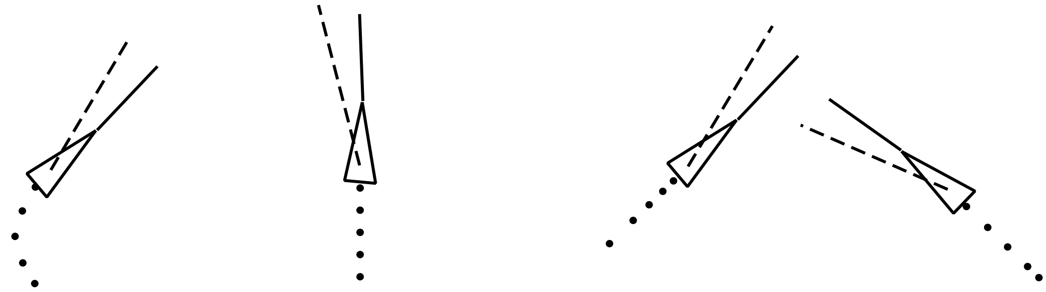
1. Press the [AIS MENU] key to display the AIS menu.
2. Press the [6] key ([MESSAGE]) to show the MESSAGE menu.
3. Press the [6] key (AUTO DISPLAY) once or twice to choose ON.
4. Press the [ENTER] key.
5. Press the any menu key to close the menu.

When a message is received the “message” display is automatically opened, showing the received message. To close the display, press any key.

7.8 History Display

The history display shows equally time-spaced dots marking past positions of activated targets being tracked. A new dot is added at preset time intervals until the preset number is reached. If a target changes its speed, the spacing will be uneven. If it changes course, its plotted course will not be a straight line.

Below are sample history displays.



(a) Ship turning (b) Ship running straight (c) Ship reduced speed (d) Ship increased speed

Sample history displays

7.8.1 Turning history display on/off

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.

```
  [AIS(2)]
1 [AIS(1)]
2 HISTORY
   OFF/ON
3 HISTORY POINTS
  5/10
4 HISTORY INTERVAL
  10/30SEC/1/2/3/6MIN
5 HISTORY COLOR
  RED/MAGENTA/YEL*/
  GRN*/CYAN/BLU/WHITE*
6 SYMBOL COLOR
  RED/MAGENTA/YEL*/
  GRN*/CYAN/BLU/WHITE*
7 ROT TAG
  000.0° /MIN
8 AUTO ACTIVATE
  OFF/ON
  RANGE  000.0NM
9 LOST TARGET RANGE
  000.0NM
0 [(AIS(3)]
```

* = Not available on IMO type.

AIS2 menu

3. Press the [2] key (HISTORY).
4. Further press the [2] key to turn the history display on or off as appropriate.
5. Press the [ENTER] key.
6. Press any menu key to close the menu.

7.8.2 Choosing history display attributes

You may choose history point color, the number of history points to show per history plot interval and the history plot interval as below.

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [3] key (HISTORY POINTS).
4. Further press the [3] key to choose number of history points to display per plotting interval: 5 or 10.
5. Press the [ENTER] key.
6. Press the [4] key (HISTORY INTERVAL).
7. Press the [4] key again to choose history interval desired among 10, 30 s; 1, 2, 3 and 6 min.
8. Press the [ENTER] key.
9. Press the [5] key to choose HISTORY COLOR.
10. Press the [5] key again to choose color desired.
11. Press the [ENTER] key.
12. Press any menu key to close the menu.

7.9 AIS Symbol Color

You may choose the color for the AIS symbols among red, magenta, yellow*, green*, cyan, blue and white*. (* = Not available on IMO type.)

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [6] key (SYMBOL COLOR).
4. Further press the [6] key to choose color desired.
5. Press the [ENTER] key.
6. Press any menu key to close the menu.

7.10 Automatic Target Activation

You may automatically activate all targets within a specific distance from own ship as below. Note that you may also automatically activate all targets within the ARPA's automatic acquisition zone or guard zone. When a target enters the ARPA's automatic acquisition zone or guard zone, it is automatically marked with the activated target symbol. If the activated target goes out of the ARPA automatic acquisition zone of the guard zone it still is an activated target. When a target enters the guard zone, the display shows "GUARD" at the lower right hand corner of the display.

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [8] key (AUTO ACTIVATE).
4. Press the [8] key again to choose ON and then press the [ENTER] key.
5. Use the numeric keys to enter automatic activation range (000.1 to 999.9 nm).
6. Press the [ENTER] key.
7. Press any menu key to close the AIS menu.

7.11 Lost Target Range

Set the distance at which an AIS target is declared a lost target when no AIS data is received for six minutes or five reporting intervals, whichever is the shorter. When this feature is activated the following occurs:

- Sleeping targets within the lost target range for which no data is received are marked with the lost target symbol.
- Sleeping targets out of the lost target range are erased.
- Any activated AIS target from which you are not receiving AIS data is marked with the lost target symbol regardless of range to the target.

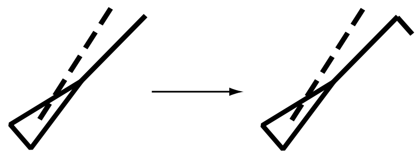
1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [9] key (LOST TARGET RANGE).
4. Use the numeric keys to enter lost target range (000.1 to 999.9 nm).
5. Press the [ENTER] key.
6. Press any menu key to close the AIS menu.

To disable this feature, enter all zeroes at step 4 in the above procedure.

7.12 ROT Display Setting

You may set the lower limit of the ROT (Rate Of Turn) at which the heading line on target symbols will point in direction of turning.

1. Press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key to show the AIS2 menu.
3. Press the [7] key (ROT TAG).
4. Use the numeric keys to enter ROT (000.1 to 359.9°/min).
5. Press the [ENTER] key.
6. Press any menu key to close the AIS menu.



ROT display

7.13 Combining AIS with ARPA (fusion)

If equipped with ARPA it may be jointly used with the AIS. In this case specify the parameters for which an ARPA target is converted to an AIS target.

1. Confirm that "ARPA" is shown at the top right-hand corner of the display and then press the [AIS MENU] key to open the AIS menu.
2. Press the [0] key.
3. Press the [0] key again to show the AIS3 menu.

```
  [(AIS(3)]
1 [AIS(2)]
2 FUSION
  OFF/ON
       POSN  0.000NM
       RNG   0.000NM
       BRG   00.0°
       SPD   0.0KT
       CSE   00.0°

       AIS ALARM MESSAGE
```

AIS3 menu

4. Press the [2] key (FUSION).
5. Press the [2] key again to choose ON and press the [ENTER] key.
6. Enter the information below, pressing the [ENTER] key after entering each data. This information will be used to determine which ARPA targets to convert.

   POSN: Range between AIS target and ARPA target.

   RNG: Enter the range difference from own ship to AIS target and ARPA target.

   BRG: Enter the bearing difference from own ship to AIS target and ARPA target.

   SPD: Enter the speed difference between AIS target and ARPA target.

   CSE: Enter the course difference between AIS target and ARPA target.
7. Press any menu key to close the AIS menu.

If the information above is within the corresponding value of the ARPA and AIS targets, the targets are judged to be the same, the ARPA symbol is erased and only the AIS symbol is displayed. Further, “ARPA FUSION” appears at the bottom right corner of the display at the time of conversion and the ARPA target no. appears next to the AIS symbol.

Note: An ARPA target whose speed is less than 1 kt is converted to an AIS target if it meets all other criteria other than course.

7.14 AIS System Messages

AIS system messages are displayed at the bottom right corner of the screen. The table below shows the AIS system messages and their meanings.

AIS system messages

Message	Meaning
ARPA FUSION	ARPA target converted to AIS target. The indication disappears when the target no longer meets the criteria set in paragraph 7.13. When the message RECEIVE is displayed, ARPA FUSION is not displayed.
COLLISION	CPA/TCPA of an AIS target is below preset value.
LOST	Lost target
RECEIVE	Not receiving AIS data
WT	This message appears when the water tracking mode is set at the radar and the data necessary for STW and CSE are not available. In this case the vector on the AIS symbol does not appear and SOG (speed over ground) and COG (course over ground) are displayed on the basic display.
GUARD	Displayed when a target enters the ARPA guard ring.
CPA/TCPA	CPA/TCPA cannot be calculated because the “WT” alarm has been violated. Further the CPA/TCPA value in basic data display is marked with an asterisk to indicate that CPA/TCPA value is not reliable.
FULL	Displayed when 1000 AIS targets have been received. (The radar can only display 1000 AIS targets closest in range to own ship.)

7.15 AIS Alarm Message

The AIS3 menu provides AIS alarm message information ($AIALR sentence) from the AIS transponder.

8 MAINTENANCE

8.1 Replacing the Battery on the RP Board

A battery installed on the RP board inside the radar display unit preserves video plotter setting data when the power is turned off. The life of the battery is about five years. When the battery voltage is low, NG (No Good) appears at the diagnostic test for the RP board. Contact your dealer about replacement, at your earliest convenience.

Battery for	Battery Type	Code Number
RP board	CR2450-F2ST2L	000-144-941

8.2 Replacing the Battery in the Memory Card

The life of the battery in the memory card is about three years. When the battery voltage is low, NG (No Good) appears at the diagnostic test for the memory card. Replace the battery at your earliest convenience to prevent loss of data.

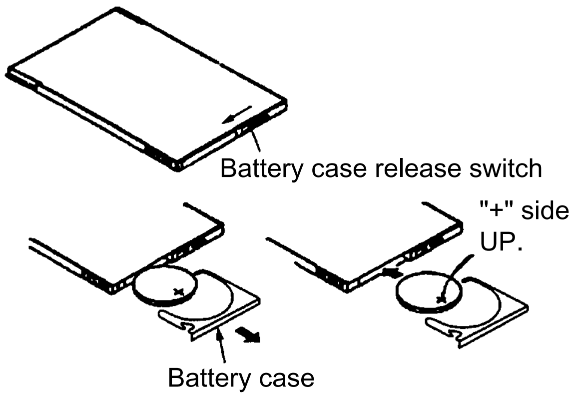
Note: Replace the battery within 10 minutes after removal to prevent loss of data.

WARNING: Use only the specified battery. Use of an incorrect battery may cause explosion. Dispose of the battery in accordance with local regulations.

Battery for	Battery Type	Code Number
Memory card	CR2025	000-141-093

1. Use your finger to slide the battery case release switch in the direction shown in the illustration below.
2. Pull out the battery case and remove the battery.
3. Insert new battery "+" side up.

   WARNING: Be sure the battery is inserted correctly. Explosion may result if the polarity is incorrect.



4. Set the battery case to the memory card.
5. Close the battery case release switch.

8.3 System Error

If the equipment fails, the message “RP SYSTEM ERROR” appears (in red) at the bottom right-hand corner of the display, the equipment switches to the radar mode and the audible alarm sounds. When this occurs, turn the display unit off and on again. If the above message does not appear, the equipment is operating normally. However, if the video plotter or radar/video plotter mode is inoperative or the above message appears, the RP is malfunctioning. Contact your dealer for advice.

9 INSTALLATION OF VIDEO PLOTTER KIT

9.1 Tabletop/Console Type

Necessary parts

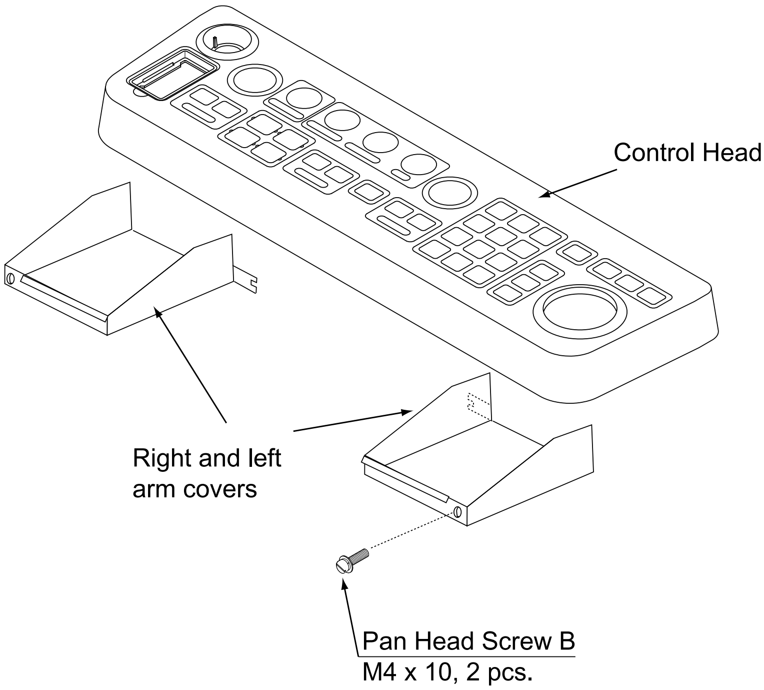
RP-250-T-2E-N (Code No. 000-080-196), For NAVIONICS specification
RP-250-T-2E-C (Code No. 000-080-197), For C-MAP specification

Name	Type	Qty	Code No.	Remarks
M-Card Assy.	—	1	—	IF board
				Cable assy.
				M-card base
				M-card lid
				M-card case
				M-card case cover
RP Board	14P0371A	1	008-528-020	For NAVIONICS
	14P0371B	1	008-528-030	For C-MAP
Pan Head Screw B	M4 x 8 C2700W	4	000-881-445	
Pan Head Screw B	M3 x 8 C2700W	2	000-881-404	Not used
Pan Head Screw A	M2.6 x 5 C2700W	2	000-800-973	Not used
Pan Head Screw A	M3 x 8 C2700W	1	000-881-104	Not used
Toothed Washer	M4 C5191W	1	000-864-506	
Toothed Washer	M3 C5191W	1	000-864-504	Not used
NH Connector Assy.	03-2059 (5P)	1	008-528-260	
Keytop Label	03-144-1531	1	100-299-820	
Program Floppy Disk	03-591-84	1	008-528-130	Note 1
Operator's Manual	OME-30470-X	1	000-809-332	

Note 1: Check radar program no. (03591840XX). If the program number of the program in the floppy disk is higher, update the program. If it is the same, it is not necessary to update the program.

Note 2: Windows PC and optional PC connection cable (Type: JEC9S-XH4P-L1500, Code no.: 000-145-362) also required.

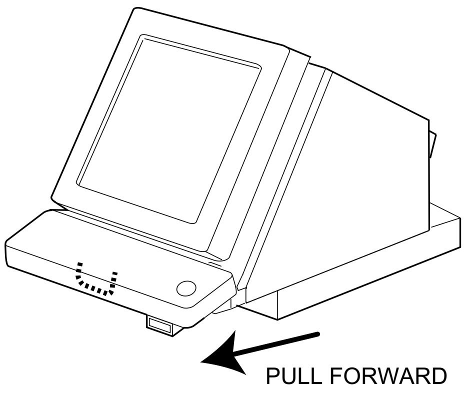
1. Remove the right and left arm covers from the control head.



Control head

2. Unfasten bolts (M10, 2 pcs.)hidden by arm covers to separate the display unit from the processor unit.
3. Pull the handle on the underside of the control head to draw the display unit forward until you hear a click.

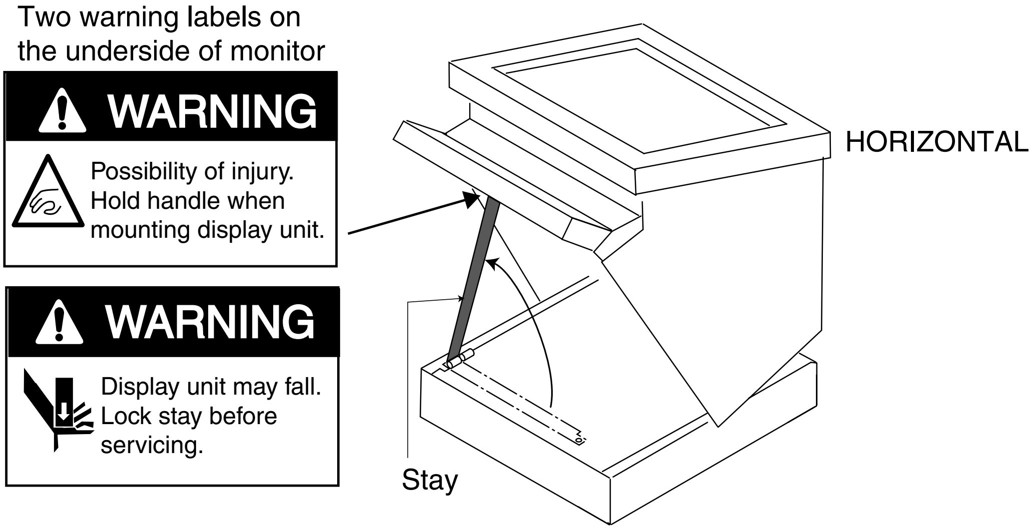
   Note: Step 4 should be performed with two persons.



Display unit

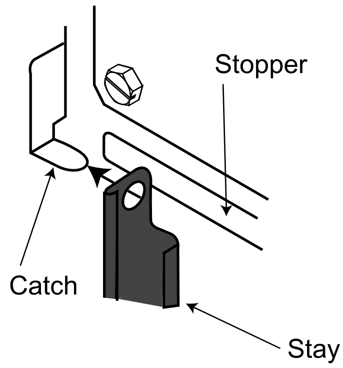
4. While raising the monitor until the CRT is horizontal as below, fix the stay as follows:

a) Raise the stay as shown below.



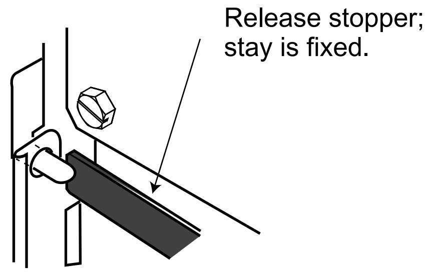
Display unit, inside view

b) While pushing the stopper, set the catch on the display unit in the hole in the stay.



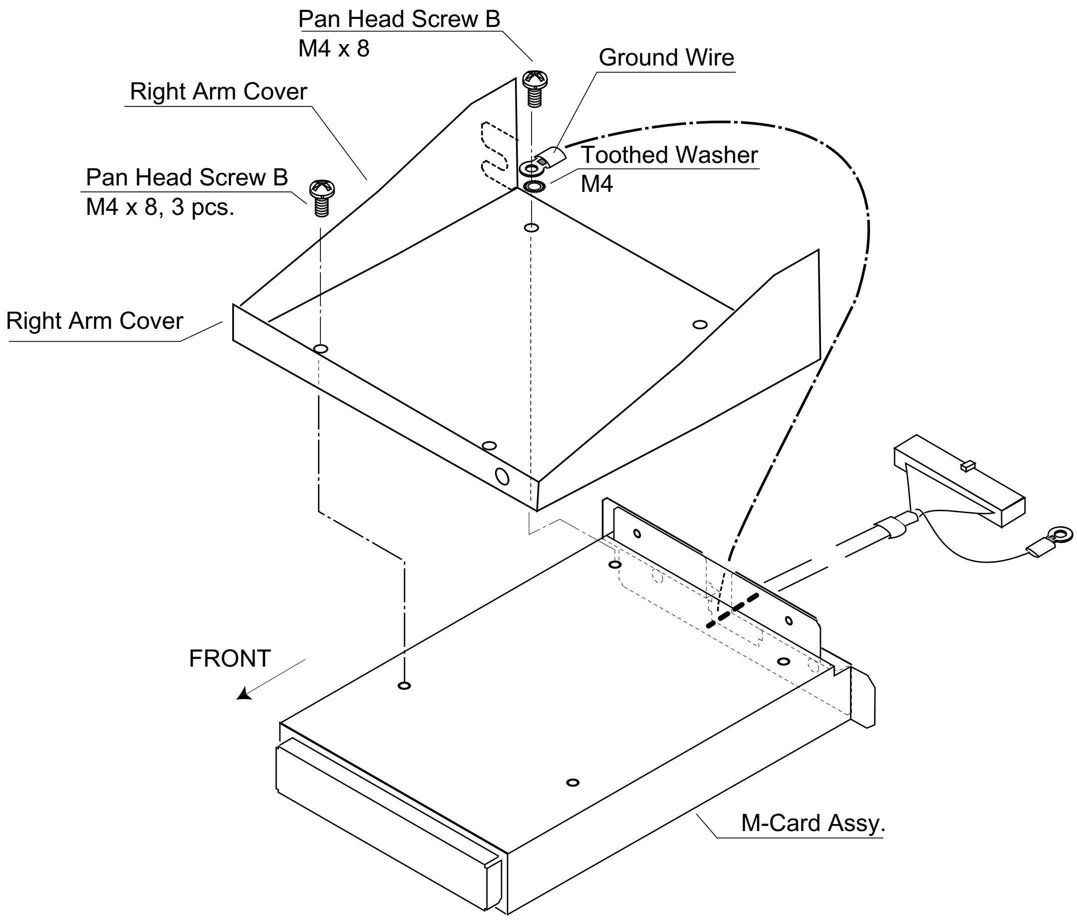
Setting catch to hole in stay

c) Release hand from stopper.



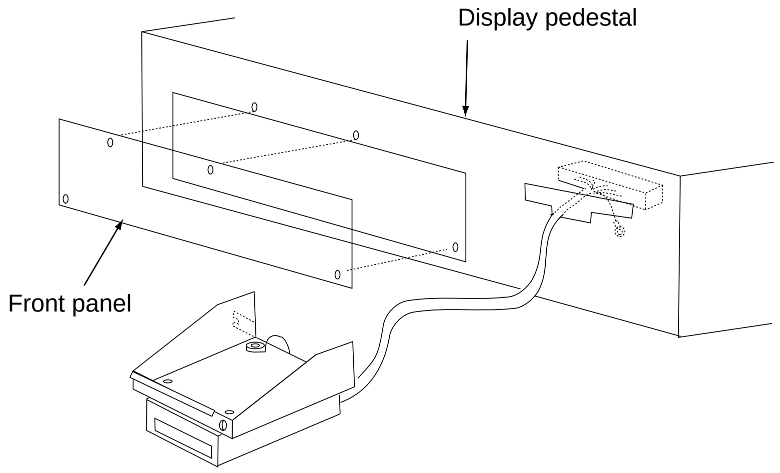
Stay fixed

5. Fasten the M-card case to the right arm cover as follows:
   a) Fasten the ground wire with an M4 x 8 screw and toothed washer (supplied) as shown below.
   b) Fasten the arm cover to the M-card case with three M4 x 8 screws (supplied).



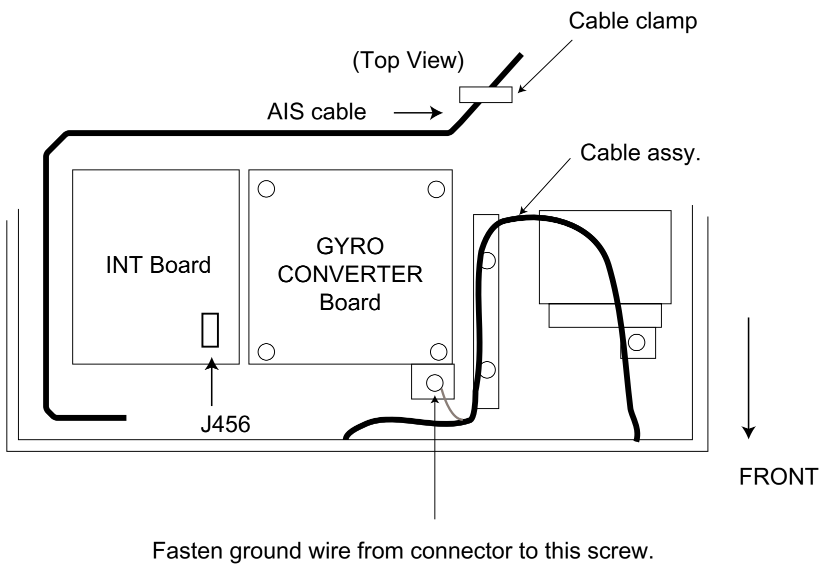
Fastening the M-card assy. to the right arm cover

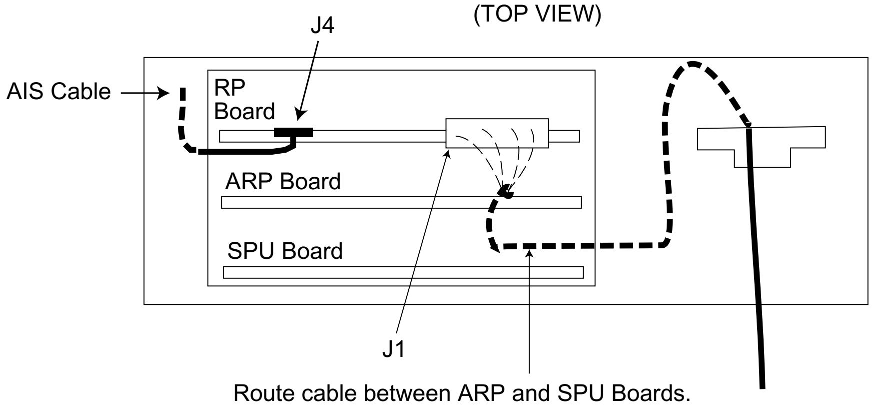
6. Unfasten the front panel from the display pedestal.
7. Pass the connector from the card assy. through the hole in the display pedestal.



Display pedestal, front view

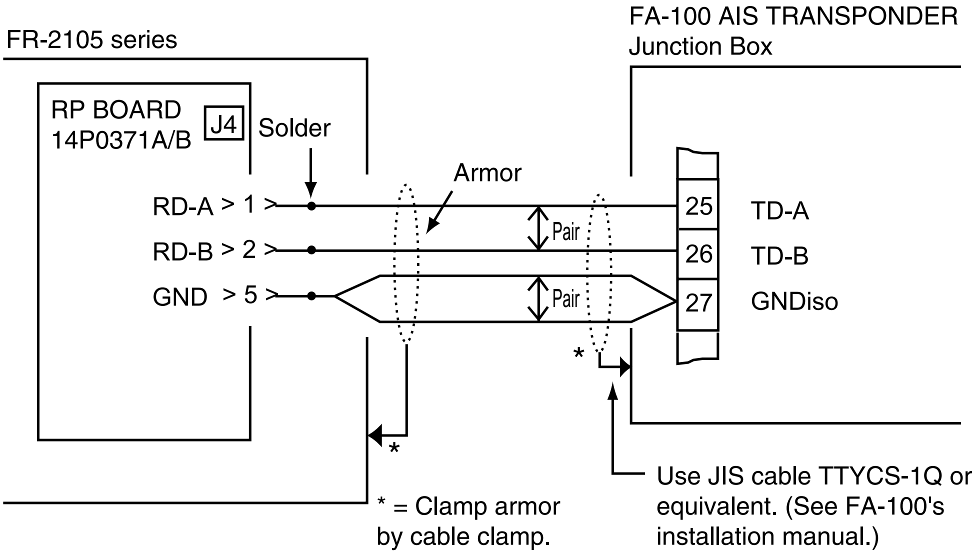
8. Set the RP Board in the top slot of the pcb card case.
9. Run the cable assembly from the card assy. in front of the GYRO CONVERTER Board.
10. Plug the connector of the cable assembly in J1 on the RP Board.
11. Fasten the ground wire from the connector at the location shown below.
12. Lead in the AIS cable through the cable clamp at the rear of the display unit. The armor of the cable should be lying in the clamp at the rear of the display unit.

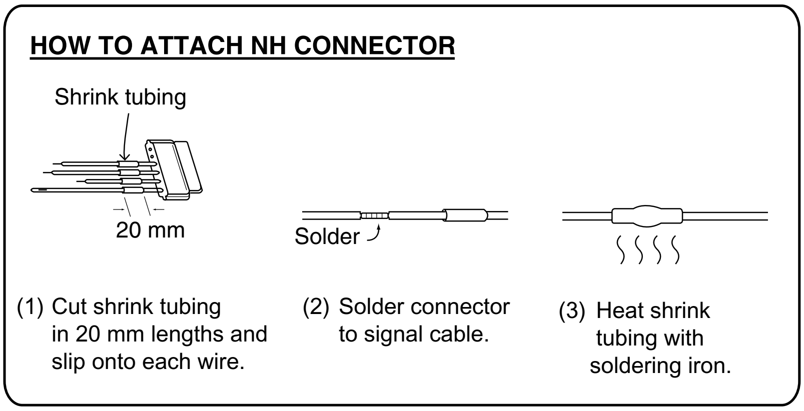




Display pedestal, top view

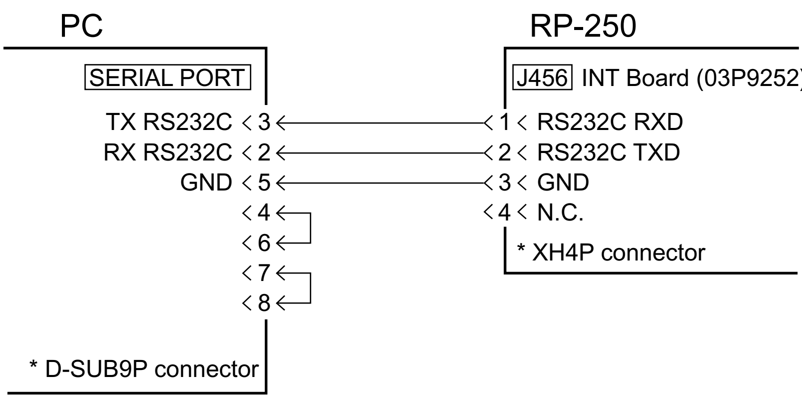
13. Attach the NH connector assy. (supplied) to the AIS cable and then connect the NH connector to J4 on the RP Board.





Wiring between RP board and AIS transponder, attaching NH connector

14. Reattach the front panel to the display pedestal.
15. Update the program (if necessary) as follows:
   a) Run the PC connection cable between the serial port (D-Sub 9 pin) on the PC and J456 on the INT Board. See the figure on the previous page for the location of J456.



PC connection

b) Insert supplied floppy disk in the PC, execute the “upe.bat” file. The PC displays “TARGET POWER ON.”
c) Turn on the display unit to load the program. The PC displays “Finish Version up.ted” when the loading is completed.
d) Disconnect the PC connection cable.
e) While pressing and holding down the [HL OFF] key, press the [RADAR MENU] key five times.
f) Press [RADAR MENU], [0], [0], [0], [2], [0], [0], [0], [0].
g) Press the [ENTER] key five times.
h) Turn the power off and on. “Initializing” appears on the display for about 90 seconds.
i) Confirm RP program no. by pressing the [RADAR MENU], [0], [0], [0], [3] and [ENTER].
**: Program number
*1: 03591870** for C-MAP specification

FR-2105 TEST

PROGRAM NO		ROM	RAM	CRAM	DISPSW
MAIN	03591840**	OK	OK		1234
ARP	18590381**	OK	OK	OK	0000
DSP	18590391**	OK	OK	OK	
RP-1	03591860**, *1	OK	OK	OK	00
RP-2	03591880**	OK		OK	00
	DRAM	OK	OK		
	RP BOARD BAT	OK		SIO	- -
	RP CARD 1	OK	CARD 2		OK
	CARD 1 BAT	OK	CARD 2 BAT		OK

ANTENNA SPEED	23.8 RPM
TRIG FREQ	143.2 Hz
MAG CURRENT	11.1 V
R. MONITOR	1.8 V
TUNE IND	0.8 V

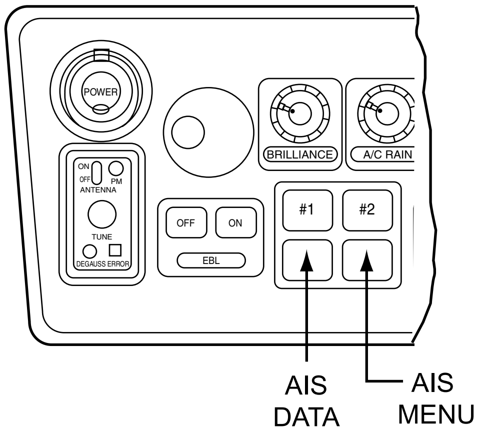
□ □ □ □ □ □ □
1 2 3 002 □ □ □ □ 2 5 1
□ □□ □□ □□ □ □□ □ □ □ □ 0 0 8
□ □□ □ □ □ □

To quit press [STBY/TX] key twice.

Test results

16. Retract the stay to close the display unit.
17. Push in the monitor until you hear a “click.”
18. Refasten bolts removed at step 2.
19. Refasten the right and left arm covers.

20. Set the #3 and #4 function keys as follows:
    a) Press [RADAR MENU], [0], [0] and [5].
    b) Press [2] to choose OPERATION and then press the [ENTER] key.
    c) Rotate the trackball to choose AIS DATA and then press the [ENTER] key.
    d) Press [1] and [6].
    e) Press [2] to choose OPERATION and then press the [ENTER] key.
    f) Rotate the trackball to choose AIS MENU and then press the [ENTER] key.
    g) Press the [RADAR MENU] key to close the menu.
21. Attach the keytop labels (supplied) to the control head as below.



Control head

9.2 Separate Type Control Head

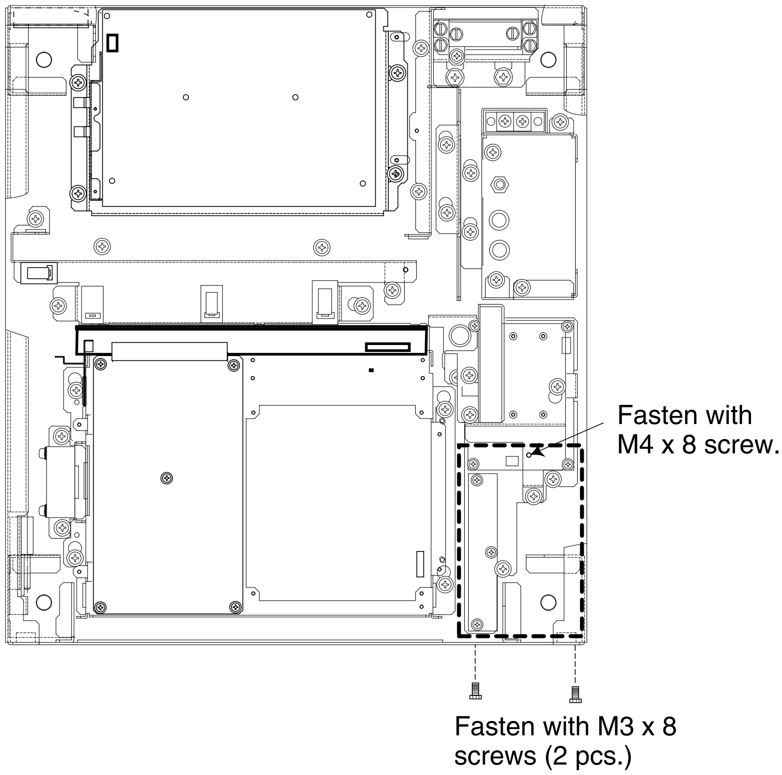
Necessary parts

RP-250-T-2E-N (Code No.: 000-080-196), For AVIONICS specification
RP-250-T-2E-C (Code No.: 000-080-197), For C-MAP specification

Name	Type	Qty	Code No.	Remarks
M-Card Assy.	—	1	—	IF board
				Cable assy.
				M-card base
				M-card lid
				M-card case
				M-card case cover
RP Board	14P0371A	1	008-528-020	For NAVIONICS
	14P0371B	1	008-528-030	For C-MAP
Pan Head Screw B	M4 x 8 C2700W	4	000-881-445	
Pan Head Screw B	M3 x 8 C2700W	2	000-881-404	
Pan Head Screw A	M2.6 x 5 C2700W	2	000-800-973	
Pan Head Screw A	M3 x 8 C2700W	1	000-881-104	
Toothed Washer	M4 C5191W	1	000-864-506	Not used
Toothed Washer	M3 C5191W	1	000-864-504	
NH Connector Assy.	03-2059 (5P)	1	008-528-260	
Keytop Label	03-144-1531	1	100-299-820	
Program Floppy Disk	03-591-84	1	008-528-130	Note 1
Operator's Manual	OME-30470-X	1	000-809-332	

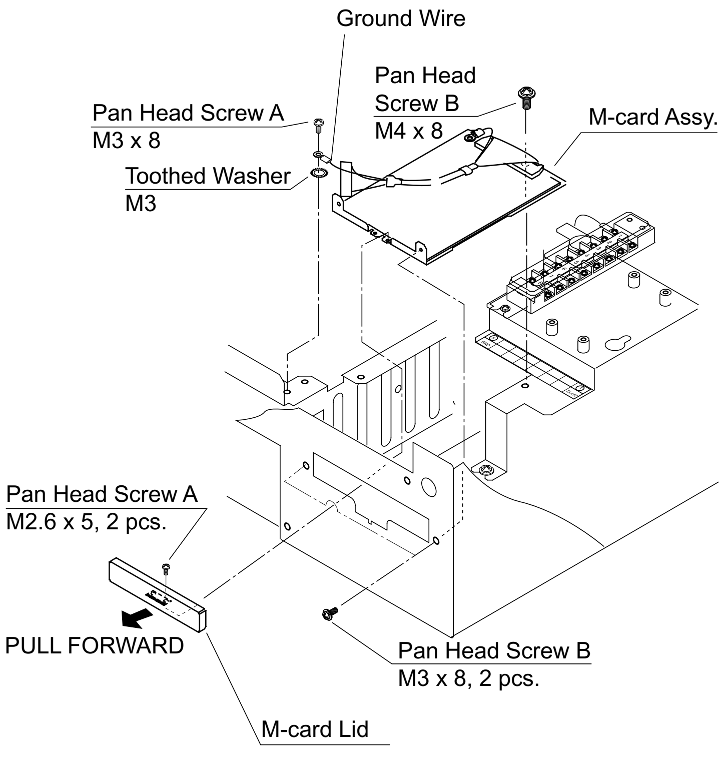
Note 1: Check radar program no. (03591840XX). If the program number of the program in floppy disk is higher, update the program. If it is the same, it is not necessary to update the program.
Note 2: Windows PC and optional PC connection cable (Type: JEC9S-XH4P-L1500, Code no.: 000-145-362) also required.

1. Follow steps 1 thru 4 in the previous paragraph to open the display unit.
2. Remove M-card lid, case and case cover from M-card assy. The case and case cover may be discarded.
3. Fasten the M-card assy. with one M4 x 8 screw as below.



Display unit, inside view

4. Fix the M-card assy. to front panel with two M3 x 8 screws.
5. Set the M-card lid to the hole in the front panel and fix with two M2.6 x 5 screws.



Display pedestal, front view

6. Fasten the ground wire in the cable assy. of the M-card assy. with an M3 x 8 screw and toothed washer (M3) as shown on the previous page.
7. Unfasten four pan head screws (M4 x 8) from the display pedestal to remove the front panel lid.
8. Set the RP Board in the top slot of the pcb card case.
9. Run the cable assembly from the M-card assy. in front of the GYRO PROCESSOR Board.
10. Plug in the connecter of the cable assembly to J1 on the RP Board.
11. Follow steps 12 thru 21 in paragraph 9.1.

APPENDIX

1. Digital Interface (IEC 61162-2)

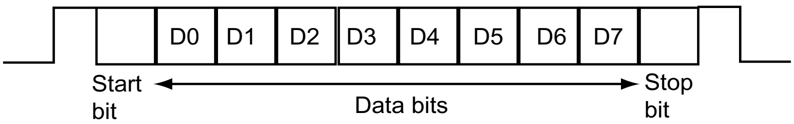
Input sentences (RP Board, J4)

VDM, ALR, VDO

Data reception

Data is received in serial asynchronous form in accordance with the standard referenced in IEC 61162-2.

The following parameters are used:
Baud rate: 38400, Data bits: 8 (D7 = 0), Parity: none, Stop bits: 1



Data sentences

ALR –Set alarm state

```
$AIALR,hhmmss.ss,xxx,A,A,c--c*hh<CR><LF>
          |        |   |  |   |   |
          |        |   |  |   |   +------------------ 6
          |        |   |  |   +------------------ 5
          |        |   |  +-------------------- 4
          |        |   +---------------------- 3
          |        +------------------------- 2
          +--------------------------------- 1
```

1. Time of alarm condition change, UTC
2. Local alarm number(identifier)
3. Alarm condition(A=threshold exceeded, V=not exceeded)
4. Alarm’s acknowledge state, A=acknowledged V=unacknowledged
5. Alarm’s description text
6. Checksum

VDM – VHF data-link message

```
!AIVDM,x,x,x,a,s--s,x*hh<CR><LF>
       | || |   |   |  |
       | || |   |   |  +----- 7
       | || |   |  +----- 6
       | || |  +-------- 5
       | || +------------ 4
       | |+-------------- 3
       |+---------------- 2
      +------------------ 1
```

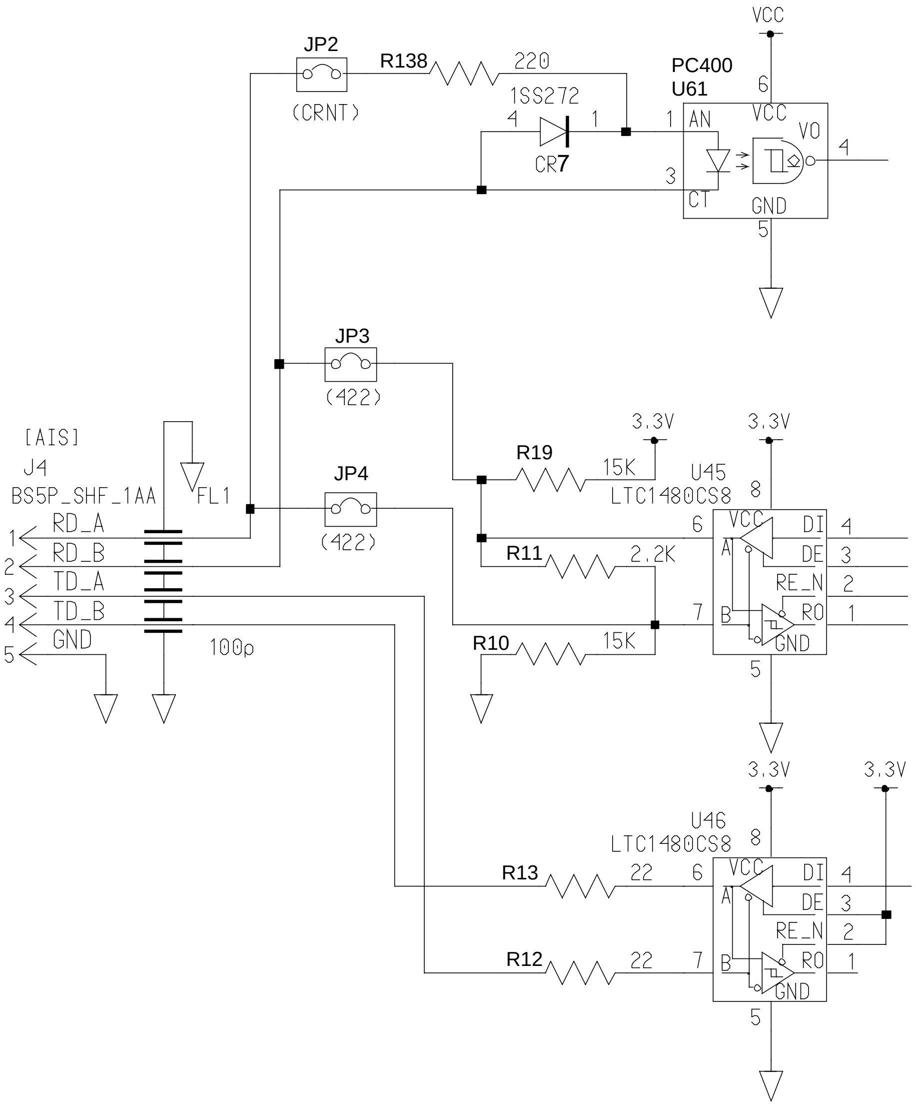
1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential message identifier, 0 to 9
4. AIS channel Number
5. Encapsulated ITU-R M.1371 radio message
6. Number of fill-bits, 0 to 5
7. Checksum

VDO - UAIS VHF Data-link Own-vessel report

```
!AIVDO,x,x,x,x,s--s,x*hh<CR><LF>
         | | ||    |  |  |
         | | ||    |  |  +--- 7
         | | ||    |  +----- 6
         | | ||   +-------- 5
         | | |+------------ 4
         | | +-------------- 3
         | +---------------- 2
        +------------------ 1
```

1. Total number of sentences needed to transfer the message, 1 to 9
2. Message sentence number, 1 to 9
3. Sequential message identifier, 0 to 9
4. AIS channel Number
5. Encapsulated ITU-R M.1371 radio message
6. Number of fill-bits, 0 to 5
7. Checksum

Schematic diagram



Load requirements as listener

220 ohms

2. Interface Function

(1) Data displayed in the Basic data display
- !AIVDM message 1-3
  COG, SOG, HDG, ROT
- !AIVDM message 5
  call sign, ship's name

(2) Data displayed in the Extended data display
- !AIVDM message 1-3
  ship's position (latitude, longitude), position accuracy, navigational status, MMSI number
- !AIVDM message 5
  call sign, ship's name, IMO number, AIS version indication, type of ship and cargo type, dimensions of ship, electronic position fixing equipment, ETA, maximum present static draught, destination

(3) Data displayed in the Message display
- ● safety related message (addressed)
  - !AIVDM message 12
    source ID, destination ID, safety-related text
- ● safety-related message (broadcast)
  - !AIVDM message 14
    source ID, safety-related text
- ● binary message (addressed)
  - !AIVDM message 6
    source ID, destination ID, binary data (text telegram)
- ● binary message (broadcast)
  - !AIVDM message 8
    source ID, binary data (text telegram)

(4) Data displayed in the own ship position display area
- !AIVDO message 1-3
  ship position (latitude, longitude)

(5) Data displayed in the AIS alarm message display area
- $AIALR (alarm's description text)

3. Main Board Modification (IEC 60936-1 related items)

When the RP-250 is installed in the radar display unit of the FR-2105 series radar, the following modifications are done to the main board (SPU board, 03P9253):

- The program of the main board (SPU board) is changed. The program no. after the change is 03591840XX. (Previous program no. 03591491XX)
  (XX = Program Version No.)
- Modifications
  - Communication feature added between the RP-250 and the SPU board.
  - AIS menu display is added.

These modifications do not affect radar features or IEC 60936-1 related features.

4. Conditions Which Display the Alarm for WT and CPA/TCPA

- When both VHW and VBW are input, priority is VBW>VHW.
- When only VHW is received, status is as below.
- When only VBW is received, status is as below.
- When neither VHW or VBW is input, log error is displayed.

STW selected on menu

When data sentence VHW is present, and set, drift and VTG are on or off:

	VHW	Set, Drift	VTG	Mode to be selected	AIS alarm display
STW displayed		ON		BT	CPA/TCPA
(Note 3)	ON	OFF	OFF	WT	WT, CPA/TCPA
STW displayed		ON		BT	CPA/TCPA
(Note 3)	ON	OFF	ON	WT	None

When data sentence VBW is present, and set, drift and VTG are on or off:

VBW	Set, Drift	VTG	Mode to be selected	AIS alarm display
	ON		WT	WT, CPA/TCPA
ON	OFF	OFF	WT	WT, CPA/TCPA
	ON		WT	None
ON	OFF	ON	WT	None

SOG selected on menu

When data sentence VHW is present, and set, drift and VTG are on or off:

	VHW	Set, Drift	VTG	Mode to be selected	AIS alarm display
		ON		BT	CPA/TCPA
SOG displayed	ON	OFF	OFF	WT	WT, CPA/TCPA
(Note 4)		ON		BT	CPA/TCPA
SOG displayed	ON	OFF	ON	WT	None

(Note 4)

When data sentence VBW is present, and set, drift and VTG are on or off:

VBW	Set, Drift	VTG	Mode to be selected	AIS alarm display
	ON		BT	None
ON	OFF	OFF	BT	None
	ON		BT	None
ON	OFF	ON	BT	None

Notes

1. Because drift is ON.
2. Because of error (no VTG data).
3. STW shown in red. BT is selected because set and drift is input even though setting is STW.
4. SOG shown in red. SOG is selected, however only VHW is input, therefore SOG cannot be displayed.
5. LOG error. Neither VHW or VBW are input.

5. Menu Tree

Video plotter

[NAV MENU] key ***Default settings in bold italics.***

- VIDEO PLOTTER(1)
  - 1 [NAV INFORMATION(1)]
    - 1 [VIDEO PLOTTER(1)]
    - 2 SELECT NAVAID (***GPS+LC***, DEAD RECKONING, AIS)
    - 3 OWN SHIP POSN (***OFF***, L/L)
    - 4 POSN (Enter own ship position.)
    - 5 +CURSOR DATA (***OFF***, L/L)
    - 6 WPT DATA (***OFF***, REL, TRUE)
    - 7 [WAY POINT]
    - 8 [NAV LINE]
    - 9 WIND DATA (***OFF***, ON)
    - 0 {NAV INFORMATION(2)]
      - 1 [NAV INFORMATION(1)]
      - 2 WIND GRAPH (***OFF***, ON)
      - 3 WIND UNIT (m/s, ***KT***)
      - 4 CURRENT DATA (***OFF***, ON)
      - 5 CURRENT GRAPH (***OFF***, ON)
      - 6 DEPTH DATA (***OFF***, ON)
      - 7 DEPTH GRAPH (***OFF***, ON)
      - 8 DEPTH SCALE (10, 20, 50, ***100***, 200, 500)
      - 9 DEPTH UNIT*1 (***m***, ft)
      - 0 [NAV INFORMATION(3)]
        - 1 [NAV INFORMATION(2)]
        - 2 WATER TEMPERATURE*1 (***OFF***, ON)
        - 3 DATE (***OFF***, UTC, LOCAL: Enter time difference.)
        - 4 USED WPL (***NAV LINE***, WP) (R-type radar only.)
        - 0 [AIS1]
  - 2 [WAYPOINT]
    - 1 [NAV INFORMATION(1)]
    - 2 WPT MARK (***OFF***, ON)
    - 3 WPT (Enter waypoint no. to display.)
    - 4
    - 5
    - 7 WPT DATA (***VIDEO PLOTTER***, NAVAID)
    - 8 ARRIVAL ALARM (***OFF***; ON: Enter arrival alarm range.)
  - 3 [NAV LINE]
    - 1 [NAV INFORMATION(1)]
    - 2 NAV LINE (***OFF***, ON)
    - 3 NAV LINE NO. (Enter nav line no. to display.)
    - 4 NAV WIDTH (***OFF***; ON: Enter nav line width.)
    - 5
    - 6 WPT (Enter waypoint no. to head to.)
    - 7 NAV LINE DATA (***VIDEO PLOTTER***, NAVAID)
    - 8 ARRIVAL ALARM (***OFF***; ON: Enter arrival alarm range.)
  - ①

*1 = R and G type fishing mode specification

(1)

- 4 [ENTER WPT, NAV LINE]
  - 1 [VIDEO PLOTTER(1)]
  - 2 [ENTER WPT]
    - 1 [ENTER WPT, NAV LINE]
    - 2 ENTER WPT (***CURSOR***, L/L, OWN SHIP POSN)
    - 3 WPT NO. (Enter waypoint no.)
  - 3 [WPT LIST]
    - 1 [ENTER WPT, NAV LINE]
    - 9 ERASE (Enter waypoint to erase.)
    - 0 [WPT LIST(2)] (Waypoint list 2 - 10)
  - 5 [ENTER NAV LINE]
    - 1 [ENTER WPT, NAV LINE]
    - 2 NAV LINE (Enter nav line and waypoint nos.)
    - 8 ADDING (Enter waypoint no. to add.)
    - 9 DELETEING (Enter waypoint no. to erase.)
  - 6 [NAV LINE LIST]
    - 1 [ENTER WPT, NAV LINE]
    - 9 ERASE (Enter nav line no. to erase.)
- 5 [OWN SHIP, TARGET PLOT]
  - 1 [VIDEO PLOTTER(1)]
  - 2 RECORD OWN SHIP PLOT (***OFF***, ON)
  - 3 OWN SHIP PLOT INTVL (***10***, 30 s, 1, 2, 3, 6 min)
  - 4 OWN SHIP PLOT COLOR (***RED***, MAGENTA, YELLOW*1, GREEN*1, CYAN, BLUE, WHITE*1)
  - 5 RECORD TARGET PLOT (***OFF***, ON)
  - 6 TARGET PLOT INTVL (***10***, 30 s, 1, 2, 3, 6 min)
  - 7 [TARGET PLOT COLOR]
    - 1 [OWN SHIP, TARGET PLOT]
    - 2 TARGET NUMBER (Enter target no.)
    - 3 TARGET PLOT COLOR (RED, ***MAGENTA***, YELLOW*1, GREEN*1, CYAN, BLUE, WHITE*1)
  - 8 SMOOTHING (***OFF***, 1, 2, 3, 4, 5, 6, 7, 8, 9)

*1 = Not available on IMO type.

- 6 [CARD] (***REPLAY***, RECORD)
  - REPLAY
    - 1 [VIDEO PLOTTER(1)]
    - 2-9 (File name disp.)
    - 0 [CARD READ2]*
  - RECORD
    - 1 [VIDEO PLOTTER(1)]
    - 2 OWN SHP PLOT (Enter file name.)
    - 3 TARGET PLOT (Enter file name.)
    - 4 MARK (Enter file name.)
    - 0 FORMAT (***NO***, YES)
- 7 PLOTTER PRESENTATION (DEFAULT, ***USER SET***)
- 8 [DISPLAY SELECT]
  - 1 [VIDEO PLOTTER(1)]
  - 2 DANGER HIGHLIGHT** (OFF, ***ON***)
  - 3 COAST LINE** (OFF, ***ON***)
  - 4 LAND DENSITY** (OFF, ***ON***)
  - 5 PLACE NAME** (OFF, ***ON***)
  - 6 MARK** (OFF, ***ON***)
  - 7 OWN SHIP PLOT** (OFF, SEPARATE, ***CONTINUE***)
  - 8 TARGET PLOT** (OFF, ***ON***)
  - 9 CONTOUR LINE** (OFF, ***ON***)
  - 0 GRID** (OFF, ***L/L***)

*: When 8 or more files are recorded

**: Not shown when "VIDEO PLOTTER INITIAL SETTING" is set to "OFF."

- 9 [ERASE]
  - 1 [VIDEO PLOTTER(1)]
  - 2 OWN SHIP PLOT (***30%***, 50%, 80%, ALL)
  - 3 TARGET PLOT (***30%***, 50%, 80%, ALL)
  - 4 MARK (***OFF***, ALL)
  - 5 WPT (***OFF***, ALL)
  - 6 NAV LINE (***OFF***, ALL)
- 0 [VIDEO PLOTTER2]
  - 1 [VIDEO PLOTTER(1)]
  - 2 NAV DATA POSN
  - 3 ALIGN +CURSOR DATA (***OFF***, ON)
  - 4 OWN SHIP CENTER
  - 6 MARK ENTRY MODE (***CURSOR***, OWN SHIP POSN, L/L)
  - 0 [VIDEO PLOTTER INITIAL SETTING] ***
    - 1 (VIDEO PLOTTER(2)]
    - 2 DANGER HIGHLIGHT** (OFF, ***ON***)
    - 3 COAST LINE** (OFF, ***ON***)
    - 4 LAND DENSITY** (OFF, ***ON***)
    - 5 PLACE NAME** (OFF, ***ON***)
    - 6 MARK** (OFF, ***ON***)
    - 7 OWN SHIP PLOT** (OFF, ***ON***)
    - 8 TARGET PLOT** (OFF, ***ON***)
    - 9 CONTOUR LINE** (OFF, ***ON***)
    - 0 GRID** (OFF, ***ON***)

***: Displayed by pressing and holding down the [HL OFF] key while pressing the [RADAR MENU] key five times.

AIS

[AIS MENU] Key

- 1 ACTIVATE TARGET
- 2 SLEEP TARGET
- 3 BASIC DATA
- 4 [EXTENDED DATA] — Detailed data for selected target
- 5 LOST TARGET
- 6 [MESSAGE]
  - 1 [AIS(1)]
  - 2 SAFETY RELATED MESSAGE (ADDRESSED)
  - 3 SAFETY RELATED MESSAGE (BROADCAST)
  - 4 BINARY MESSAGE (ADDRESSED)
  - 5 BINARY MESSAGE (BROADCAST)
  - 6 AUTO DISPLAY (***OFF***, ON)
- 7 ACTIVATE ALL TARGETS
- 8 SLEEP ALL TARGETS
- 9 AIS (***OFF***, ON)#
- 0 [AIS(2)]
  - 1 [AIS(1)]
  - 2 HISTORY (***OFF***, ON)
  - 3 HISTORY POINTS (***5,*** 10)
  - 4 HISTORY INTERVAL (***10***, 30 s; 1, 2, 3 , 6 min)
  - 5 HISTORY COLOR (RED, MAGENTA, YELLOW*, GREEN*, ***CYAN***, BLUE, WHITE*)
  - 6 SYMBOL COLOR (RED, MAGENTA, YELLOW*, GREEN*, ***CYAN***, BLUE, WHITE*)
  - 7 ROT TAG (Enter shIp's rate of turn.)
  - 8 AUTO ACTIVATE (***OFF***, ON: Enter auto activation range.)
  - 9 LOST TARGET RANGE (Enter lost target range.)
  - 0 [AIS(3)]
    - 1 [AIS(2)]
    - 2 FUSION** (***OFF***; ON: Position, range, bearing, speed, course)

*: Not available on IMO type.
**: Displayed with ARPA connection
= Not displayed on IMO G-type radar when using dead reckoning navigation.

SPECIFICATIONS OF VIDEO PLOTTER
RP-250

1 GENERAL

1.1	Display	Display of FR-2115 series Radar
1.2	Display Mode	Radar picture overlaid on plotter picture
1.3	Presentation Mode	North up (NU), True motion (TM), Course up (CU), Head up (HU), Cursor Gyro (CG) HU and CG modes display ship's course, marks and course line only.
1.4	Display Range	
	FR-2115:	0.125/0.25/0.5/0.75/1/1.5/2/3/4/6/8/12/16/24/34/48/72 NM
	Others:	0.125/0.25/0.5/0.75/1/1.5/2/3/4/6/8/12/16/24/34/48/96 NM
1.5	Usable-latitude	80° or below
1.6	Coastline Data	Furuno card and Navionics card or C-MAP card, selectable
1.7	Track	
	Memory Capacity	20,000 for own ship, 20,000 for other ship
	Plot Interval	10 s, 30 s, 1, 2, 3, 6, 10, 20, 30, 60 min, and OFF
1.8	Marks	
	Memory Capacity	20,000 points
	Marks' Type	Fish school, Wreck, Lighthouse, Buoy illuminated, Buoy, Radio Station, Measuring point, Obstacle, Reef, Wharf, Anchor, Line end mark, Line (three patterns), blank, Waypoint Number
1.9	Alphanumeric Data Indications	Own ship's position (L/L) Cursor intersection (L/L) Range and bearing to a selected waypoint Range and bearing from the origin mark to the cursor intersection Range and bearing to waypoint Water temperature and depth, date and time
1.10	Alarm	Waypoint arrival alarm

2 AIS INDICATION

2.1	Symbol	Sleeping/ Activated/ Dangerous/ Selected/ Lost targets
2.2	Number of Targets	1,000 max.
2.3	Data Indication	Basic and Extended data
2.4	Track	10 or 5 points per 1 target
2.5	Alarm	CPA/TCPA alarm

INDEX